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The Citrus Industry

Issued Monthly

Representative of every Interest
Representing no special interest

VOL. 6, NO. 4 TAMPA, FLA., APRIL, 1925 15 CTS. A COPY

A Name That Consumers Say Every Day In The Year

The best selling food products are those which women have learned to ask for by name every day in the year. Shoppers develop confidence in a trade name that is always before them. There are so many thousand brands of food products that women can't be expected to know those that are on and off the market, disappearing entirely for months at a time.

That condition has been the chief difficulty in familiarizing women with fresh fruit brands and developing their confidence in the brand names. Only one brand name, used on Florida fruit, is used on a line of fruits and vegetables which women may buy every day in the year.

That brand name is Blue Goose.

Seeing a complete line of fresh fruits and vegetables the year round under the Blue Goose trademark women have had the trademark fixed in their minds. It has become familiar to them like Ivory, Campbell's, Heinz, etc. They have learned to have confidence in it. They buy fruit under that name readily. By doing so save the retailer's time, and his time is worth money. Is it any wonder retailers prefer to handle fruit under such a brand?

American Fruit Growers Inc.

Orlando, Florida

AFG

BRIGHT FRUIT NUMBER

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Wanted---

A New Anti-Fraud Law

Will You Co-operate, Mr. Grower?

It is our desire to see the legislature of the State of Florida enact a law that will protect the user of insecticides as well as the legitimate manufacturer from the enormous damage done through the unrestricted marketing of spurious and misrepresented products.

At the present time the grower may buy sulphur, for example, guaranteed by the salesman to be 250 mesh fineness. If the grower finds, upon using this sulphur, that it is hardly 150 mesh, no recourse is to be had. Nicotine dusts, oil sprays and other insecticides have been so misrepresented. This not only is a loss to the user, but such practices harm the industry as a whole by ruining confidence in really worth while insecticide products.

There are so many factors to consider in insecticide crop protection other than the quality of the product, that so called guarantees are impossible, it is possible, however, to enact a law which will compel the manufacturer to deliver nis product as represented.

It will take much consideration to draft a law, fair to all concerned, which will cover the subject. We would like your suggestions and, in the meantime, we urge that you talk to your senator or representative.

The business of this organization is to sell RESULTS, not merely so much insecticide material. Your confidence is our greatest asset and is the natural result of QUALITY—the ultimate reward of SERVICE. The better we serve the more we profit.

Distributors of ***Niagara*** Dusts and Dusters

EMULSOEMULSOEMULSOEMULSOEMULSOEMULSOEMULSO

There is every assurance that the Citrus Industry of this state is on a firm substantial footing. The grower received fair prices for his product last winter and may expect to do so in the years to come

The forward looking planter will therefore lay his plans to round out his acreage and right now reserve the choicest trees to insure his getting exactly what he wants.

"Glen Trees Grow"

Glen Saint Mary Nurseries Company

Offices:

Tampa,	Winter Haven,	Orlando,
8th Floor	First State	Orlando Bank & Trust
Citrus Exchange Bldg.	Bank Bldg.	Co. Bldg.

Over forty-two years of Satisfied Customers has made this the largest Citrus Nursery in Florida.

From Oregon to Texas and Up to Maine

In every section of the country has the Florida Citrus Exchange gone this year to create new demand and more sales for the products of its growers—Sealdsweet Florida grapefruit and oranges.

Salaried representatives of the Exchange sales organization have been constantly in the field, opening new outlets for citrus distribution and selling greater quantities in the older established markets.

Dealer sales crews of the Florida Citrus Exchange in four months covered fifteen large markets, personally calling upon 23,870 retailers to decorate their stores with Sealdsweet displays and sell them more grapefruit and oranges.

In little more than a month, the Florida Citrus Exchange mailed complete sets of Sealdsweet display advertising matter to some 7,000 dealers—retailers in small outlying towns who could not be economically reached any other way.

The result of this work is a greater demand for Florida fruit—and a preferred demand for Sealdsweet.

TRADE MARK Sealdsweet REGISTERED

Join the Florida Citrus Exchange and cash in on the Sealdsweet trade-mark. Complete information regarding the operations of this organization can be had at its Tampa headquarters or at the offices of any of its affiliated sub-exchanges or local associations.

Florida Citrus Exchange

A Cooperative Organization of 7,000 Florida Orange and Grapefruit Growers

Headquarters at Tampa

The Citrus Industry
THE ONLY PUBLICATION IN THE WORLD DEVOTED EXCLUSIVELY TO CITRUS FRUITS
Issued Monthly
Representative of every interest—
Representing no special interest

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Horticulturists Gather in Lake County

It is fitting that the Thirty-Eighth Annual Session of the Florida State Horticultural Society should meet at Eustis, among the lakes and hills and citrus groves of Lake county, third in volume of production among the citrus producing counties of Florida. Here citrus production is the dominant factor among the citizenry of both Eustis and Lake County, and here some of the finest citrus developments in the state are being carried on. Lake county, too, is the home of some of the largest and best known citrus nurseries of the state, while other forms of horticultural effort are carried on to an increasingly great extent.

By the time this issue of The Citrus Industry is off the press, the opening session of the State Horticultural Society will have convened with headquarters at the palatial Fountain Inn, one of Florida's most noted tourist hotels, held open beyond its usual season for the accommodation of this statewide gathering of the leading horticulturists of the South's most successful horticultural state.

This meeting will bring together many hundreds of the progressive citrus growers and other horticulturists whose efforts have spread the fame of Florida to every part of the earth —a fame which is now bringing to the state the farseeing residents of other states and other nations.

Here, among nature's most wondrous works, these men will discuss the problems of the grower and horticultural enthusiast—and here many of these problems will be solved in the very heart of Florida's citrus development.

Magnolia Avenue

View of New Bulkhead

Eustis "Queen City" of the famous lake region of Central Florida, has developed into one of the most charming cities in this state. "Eustis is a beautiful city," is the frequent and appropriate expression that has been applied to this city by hundreds of satisfied tourists and visitors. Contrary to what might be presumed, Eustis is not only a tourist city, but is a progressive town of rapid and

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Bright Fruit from the Marketing Viewpoint

In an interview with F. L. Skelly, Manager, American Fruit Growers Inc., with reference to the advantage to growers from the marketing standpoint of producing good, clean, bright fruit, Mr. Skelly says:

"It is a well known fact that producers of superior articles invariably reap the reward to which they are rightfully entitled and Florida citrus fruit is no exception.

"A glance at the auction reports from the large markets where practically all citrus fruit is sold at auction will fully convince every grower how well it pays to produce good, clean, bright, fruit and then have it properly advertised and distinguished in such a way as to insure the buyers knowing exactly what they are getting at all times. One of the indispensable requisites in marketing quality fruit is to keep the grade up to the point where the trade know they are getting a dependable article.

"I do not mean to convey the impression that all growers can produce bright, thin-skinned fruit. Soil, root stock, and climatic conditions have much to do with this, also the bud wood used of the different strains of fruit. It is well known that we have many strains of pineapple and Valencia oranges in this state some being greatly superior to others.

"With the increased production of citrus fruit is a matter of greater importance than ever before for growers to produce the best fruit possible and for them to give their groves the best possible attention in the matter of fertilization, spraying and pruning. In starting new plantings very careful attention should be given to the root stock and bud wood used.

"This season the prices realized on oranges generally have been very good throughout the season, and very low grade oranges have been sold at profitable prices on account of the damage done in California and the prosperous condition of the country, oranges being in somewhat shorter supply than during last season. The Valencia crop is now bringing exceptional prices; however, fine quality Valencias are selling in many cases at $2.00 to $3.00 a box over the price being received for an inferior article.

"Grapefruit prices have ruled generally moderate to low this season but producers of superior quality grapefruit have had very satisfactory returns when the fruit has been sold under well known trade names, while fair to poor quality, rough, scabby, misshapen grapefruit has sold in many instances at less than freight and packing charges.

"Unfortunately, many growers of ordinary fruit consider their fruit very fine in every respect. They eat it themselves and enjoy it, send it to their friends from whom they receive complimentary letters, and they cannot realize why people will not buy this fruit at top prices, when they feel that it is of such fine eating quality. However, their fruit is not viewed in the same light by expert packers or by the trade, for the reason that fruit is bought by the eye and the consuming public generally will pay a good price for an article if pleasing in appearance. In Florida we are attracted to buying red apples of attractive coloring, generally well shaped, when we would pass by barrels of apples that are of different sizes, mishapen and not graded and packed in the manner of boxed apples. In other words we feel that we know just what we are buying when we buy even sized, well colored apples; although the barrelled apples may be better flavored than the more attractive boxed apples, they do not appeal to the eye.

F. L. Skelly, Manager American Fruit Growers Inc. Orlando, Florida.

"With the increased production fruit of poor appearance will continue to be much less profitable and in numerous cases will be absolutely unprofitable to growers.

"In looking over the report of sales on the New York market any day you can see that really fine grapefruit sells at very profitable prices, some of it selling at extreme prices, when other fruit is barely bringing freight and packing and in some instances less than freight and packing.

"California fruit has become stabilized in the minds of the consuming public for the reason that they have two varieties of fruit principally, known as navels and Valencias while we probably have every known variety grown in this state. California fruit on the whole also, has a much better appearance than Florida fruit, being bright and clean and on account of this better appearance they outsell Florida fruit in spite of the fact that our fruit is considered by most people as being heavier in juice content and of better flavor.

"The grades of Florida fruit are generally known as brights, goldens and russets. In recent years the russet grade in many instances is a cull grade and much fruit showing melanose, and that is scabby and mishapen has gone into this grade. While it is always desirable to produce bright or golden fruit, in some cases it seems almost impossible to control the rust mite. Russet fruit sells well in some markets if it is real russet fruit, but at present anything that is not good enough to go into the bright and golden grade is graded as russet in so many instances that the trade is not able to identify the russet grade as containing really good russet fruit.

There has been considerable advertising done and large amounts of money spent in advertising Florida fruit, but along with any advertising plan must come the standardization of the fruit so that anything under a well known trade name will be fully guaranteed to the consuming public. In other words, it is a mistake to advertise Florida fruit that does not come up to certain specifications of quality. To get the best results out of quality fruit it should be so marked that it can be identified with the advertising. The public must have some way of determining what is first class guaranteed fruit and what is known as second grade fruit, of which there is a great quantity put on the markets. In many instances the public is buying choice or second grade Florida fruit without being able to make the distinction between this and really fine fruit.

"The fruit that is now put out with the trade mark branded on the skin has come to be recognized by the public as a product that is standardized, and that in buying this product they have a guarantee of quality thereby knowing what they are getting at all times. This is of course of great benefit to producers of high class fruit. Therefore the crux in the advertising of the organization shipping this trademarked fruit is a realization of this point and the advertising is so handled as to bring this fact before the people at all times.

"It is well known fact that both wholesalers and retailers are better pleased to handle any merchandise under an advertised trade name as products of this nature are half sold, but it is very necessary that the quality of the product itself be such that it will bring repeat orders. When the consumer begins to recognize a trade name that is supported by an article that can always be relied upon, naturally they are going to buy that product continuously, just as we buy trade marked articles of clothing, hats, footwear, etc.

"Fruit can be produced in the best manner possible but the packing house can also add untold value to fruit by the proper handling. It is most important that fruit be put out in the most attractive manner possible, using good quality boxes, wraps and all other materials. The wraps should be put on the fruit very carefully as the manner in which the wrapping is done in some of the packing houses detracts greatly from the appearance of the package instead of adding to it. The fruit must also be thoroughly washed in the packinghouse and put in the proper grade to obtain for the growers the best results.

"While a great deal has been done to improve the handling of fruit in this state there are still many mechanical defects. Rough handling, clipper cuts by the picking crews in the field, and improper handling in putting it through the machinery in the packing houses. Naturally this tends to decay and both the wholesale and retail dealers are now getting to the point where when they buy a box of fruit of any kind they want it absolutely sound. There is nothing that gives Florida fruit more undesirable publicity than by having it arrive in the markets in decayed condition.

"Another point that is most important is that a much larger quantity of our fruit should be sold fob and billed direct to the point at which it is sold. Thousands of cars of Florida fruit are tramped around the country and allowed to lose its fresh appearance before it reaches the final consumer. The more quickly we can get fruit from the tree to the consumer the more pleasing it will be in both flavor and appearance. Unless we can sell at least 75 per cent of our fruit on an fob basis, billed direct to the markets in which it is sold, we cannot expect to please the consumer with our products.

"The marketing of good fruit is a specialized business and growers and producers of good fruit naturally should ship their fruit in company with other good fruit in order to get the best results, for fruit, as well as people, is known by the company it keeps. Inferior fruit on the other hand is becoming an increased burden not only to the marketing agencies but to the growers themselves.

"Good clean fruit properly handled will in the future as well as in the past be profitable to the grower. Poor fruit has been very unprofitable during the past two seasons and in all probability will be unprofitable in future years.

"The wholesaler, the retailer and the consuming trade is getting more critical each season; therefore, it is up to the growers to produce good quality fruit and to see that the packing house that handles their fruit both in the harvesting and packing is doing this work in the best manner possible.

"To the grower who contemplates making further plantings we would advise planting only standard varieties. Do not try to market your fruit before it is fully matured or after it begins to deteriorate at the end of the season, when the seeds are beginning to sprout and the fruit is becoming dry. Great harm can be done to the best established trade name by putting out inferior fruit either early or late in the season.

"If growers will give the necessary attention to production; have their fruit handled through packing houses that give the fruit proper attention; and then select a marketing organization that will sell their fruit along scientific lines backed up by judicious advertising, they need have no fear for the future of the citrus industry in Florida."

It is important that the growers keep down the numbers of the aphids until the young fruit has set and become large enough to be no longer attractive to them. Growers who are able to accomplish this will prevent an immense amount of damage to the coming crop.

Spraying and Dusting for Control of Insects and Mites on Citrus

By W. W. Yothers, Orlando, Florida

No doubt a great deal of the information given in this article is familiar to those citrus growers who have been engaged in the business for the past few years. Owing to the fact, however, that so many people have recently purchased citrus properties, there is a justification in presenting ideas which have been given out several times heretofore.

It should always be remembered that in fighting insects in Florida that practically all of the species injurious to citrus trees are attacked by entomogenous or beneficial fungi. The abundance of these fungi and consequently their value in controlling the pests depends largely upon weather conditions. During damp or wet weather these fungi develop at a marvelous rate and do great good in destroying injurious insects. In groves located on palmetto or low hammock these fungi thrive better than in groves on high pine land and therefore it is not necessary to spray or dust so often to control the pests. Oftentimes, however, during long periods with little or no rains the weather is more suitable for the development of the pests than it is for the growth of the beneficial fungi. Under such conditions it behooves the citrus grower to take such measures as will be profitable in the production of his crop. Then again, the use of fungicides for the control or prevention of citrus diseases makes the situation more complicated than perhaps would otherwise be the case. It is practically a certainty that if any fungicide is applied to citrus trees for the prevention of diseases, it will also possess enough fungicidal value to retard the development and growth of those fungi which destroy insects. At any rate, this has been the universal experience for many years. For the purpose of this article it may be best to discuss the spraying of those groves in which the beneficial fungi are permitted to develop almost normally and the treatment of those groves which have been sprayed to eliminate such diseases as melanose and scab.

The Control of Insects in Groves Where no Fungicides Have Been Used

Oranges—

If fall or winter spraying with an effective oil emulsion has been thoroughly given for the control of scale insects and white flies, the trees should be free from these pests to such an extent that spraying in the middle of May should not be necessary. On the other hand, if the trees are being seriously injured by scale insects and numerous white flies are present, it is certainly advisable to spray with oil emulsion some time about the middle of May. Even though some adult white flies of the second generation may have appeared by this time, this should not prevent spraying in case the insects are causing financial loss. Spraying done at this time may cause "shadowing" to the fruit. These so-called shadows are areas of the rind which have become more or less oil soaked. It is only rarely that this results in permanent injury. Nearly all of it disappears in a few weeks and usually a complete disappearance of all traces of it takes place before fall. This shadowing is the chief draw back to the use of oil sprays on citrus trees. During May the ordinary emulsions should be used so as to contain 1 per cent oil in the spray material.

Probably 95 per cent or more of the rust mites on oranges appear in the middle of the month. One year, however, they were most abundant more than a month earlier and another season they were most abundant probably the first of July or even a week later. It should be borne in mind that if russeting is allowed to develop it cannot be removed by spraying since the epidermal cells of the fruit have been injured. The time to spray, then, to prevent the injury resulting from this pest is as late as possible and when they may be present in great numbers but before any discoloration of the fruit has developed. As a usual thing, this is some time during the first two weeks in June. The citrus grower should have a hand lens to enable him to see these mites when they are on the fruit and foliage, which will enable him to learn when they are present in sufficient numbers to warrant treatment, otherwise spraying may be given when few mites were present or too late to accomplish the desired end.

It should be pretty well known that sulphur in any form is very satisfactory in controlling rust mites. If spraying is resorted to in all probability lime-sulphur solution will be found to be the most economical used at about 3 gallons to the 200-gallon tank. If sulphur is dusted on the trees, it will be just as effective as spraying unless it is followed by rains within two or three days. In fact, dusting when followed by rains within three or four hours, it is much more effective than the theory of rust mite control might indicate. We believe, however, that dusting should be given during the hottest and driest portion of the year and also when speed is the important factor under consideration. This method also can be used to advantage when the trees are heavily laden with fruit in January and February.

It would be well for citrus growers to make observations on the rate of re-infestation by rust mites following spraying as compared with that following dusting with sulphur. It is more than likely that spraying has more of a fungicidal value that the dusting and therefore it would prohibit the development of the rust mite fungus more than dusting. This is only an idea given in order that these operations might be of more interest to the citrus growers.

Sometime from October 15th to February 1st the trees should be thoroughly sprayed with an oil emulsion using about 1 per cent of oil in the diluted spray. The nearer this is given to the middle of October the sooner the trees will be relieved of the devitalization caused by these pests. Tangerines should be sprayed three weeks or a month later than oranges.

Grapefruit—

The only difference in the treatment that grapefruit should receive from that of oranges is that the former fruit should receive the first spray-

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Control Melanose and Thereby Prevent "Ammoniation"

By J. R. Winston, Orlando, Florida

Citrus melanose is without doubt the most important infectious disease of citrus fruits in Florida and strangely enough "ammoniation" the most important one-parasite disease of Florida citrus fruits is prevented whenever melanose is controlled by copper sprays. Moreover these two major diseases are easier by odds to control than any other two diseases we can think of, regardless of their importance. Both melanose and "ammoniation" render affected fruit unsightly, cause it to be packed as a lower grade, and have an undesirable effect upon its carrying quality, and in addition "ammoniated" fruit is likely to be insipid in taste.

Those whose fruit is affected by either melanose or ammoniation should read this article although it deals principally with melanose.

Melanose may be found on leaves, fruit and twigs of many citrus species. Young citrus melanose lesions occur on tender leaves first as minute, almost invisible, dark, round, sunken depressions with yellowish margins. After the leaf ages the spot becomes flush with the surface and later becomes distinctly raised with a somewhat irregular margin. If the infection is severe, the leaf partially loses its natural green color and takes on a paler or yellowish shade.

Lesions on fruit are similar to those on leaves. They are at first dark and sunken without discolored borders, later becoming brown, distinctly raised and rough to the touch, giving rise to the name "sand-paper russet." Usually this tissue remains throughout the life of the fruit. When the infection is slight, the melanose spots are usually scattered and they may be simply brown, raised dots with or without grayish borders or they may be very minute flecks, the center of which is brown with a zone of grayish, almost normal tissue and with an outer zone of brownish melanose scar tissue. If the infection is severe, melanose are much more numerous and they appear in tear streaked patterns or as solid scar tissue that may cover the greater part of the fruit. Shallow cracks of rather regular patterns develop in this dead scar tissue; this type is usually referred to as "mud-cake" melanose. These affected areas usually persist throughout the life of the fruit but in some instances this brown, rough tissue has a tendency to slough off particularly the mud-cake melanose.

On twigs the infection appears at first very much like it does on the leaves, and later these spots if few in number become much more raised than on leaves or fruit and in some instances resemble forms of dieback.

There are a number of blemishes commonly confused with citrus melanose; the most common being "ammoniation." "Ammoniation" is considered a form of dieback, a common nutritional disease of citrus. These blemishes are rare on grapefruit but on oranges they are confused with melanose although totally different as to origin; the former being parasitic and the latter non-parasitic. When the two occur on the same fruit it is difficult to distinguish between them on either mature or immature fruit, especially so when the two types occur in slight to moderate amounts. "Ammoniation" spots on the orange are larger, more raised and usually of a lighter brown color than melanose. When these spots are examined under a hand lens, minute cracks may be found on the raised parts. These spots usually glazed by a resinous excretion and beneath them minute gum pockets are usually present. In very severe cases gum deposits may be found even in the central pulpy axis of the fruit. Thus it is evident that "ammoniation" and melanose can easily be confused.

Citrus melanose is caused by the fungus PHOMOPSIS CITRI, which also causes a stem end decay of a wide range of citrus fruits. This fungus breeds in the bark of dead fruit stem, twigs, limbs, etc., and from such places liberates spores in large numbers whenever rainy periods occur. So far as is known, the disease spreads from dead tissues. Parts that have recently died are a more fertile source of infection than parts that have been dead for many months. Spores of the melanose fungus are spread by rain drip and dew drip from these dead twigs to leaves, fruit and twigs below. If the leaf is young and tender and if the weather conditions are favorable for infection, the spore germinates and causes the melanose markings. The fungus does not remain alive in these brown, raised spots, contrary to the general popular belief.

Young orange fruits are quite susceptible to melanose infection from blooming time until they reach a size of about 1½ to 1¾ inches in diameter, and grapefruits are susceptible until they are about 2½ to 3 inches in diameter. Larger fruits are practically immune to infection. Ordinarily the spring bloom oranges and grapefruit reach the above mentioned diameters by about the 10th of June.

Melanose infections are likely to occur in Florida at any season of the year when rainy periods coincide with the time when leaves, twigs or fruit are in a susceptible condition. Scattering melanose scars have been observed repeatedly on flushes of growth developing in winter and frequently on those expanding in early spring but, for all practical purposes, melanose is not apt to occur in quantity on the early spring flush. Almost every year rainy periods occur in March,—well after the spring vegetative flush has hardened and long before the fruit has become resistant. When these March rains occur, a moderate amount of fruit and flower infection invariably takes place but, ordinarily, infections of commercial consequence seldom occur before May; April being one of the driest months of the year. Fruit setting in May or June is very likely to have melanose markings although as a general rule spring bloom fruit in Central Florida has melanose worse than summer bloom fruit. This seems to prevail throughout the citrus belt of Florida wherever the disease is found.

Although citrus melanose occurs throughout the citrus regions of the Gulf Coast States, this disease occurs at its worst in Central Florida where it is regularly a severe disease varying in intensity from locality to locality and somewhat from year to year. Melanose is generally distributed throughout the citrus belt of Florida and it is a serious disease in most of the old citrus districts and is becoming gradually worse where it has heretofore occurred in minor amounts. Wherever the groves are relatively young, i. e., less than ten or twelve years old, the disease is not usually serious, but it is becoming progressively more and more abundant with the age of the plantings and

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Use and Abuse of Dust Method for Grove Pest Control

By H. W. Dye, Orlando, Florida

Since the introduction into Florida, five years ago, of dusting for rust mite and red spiders this has become an established grove practice. With the advent of the citrus aphid a new application of the dusting method has been developed, and is meeting with general use thorughout the state. This present universal interest in dusting justifies some remarks regarding the proper use of this method.

The most effective control of grove pests demands that highest quality materials be properly applied. The aphid is especially exacting in this respect, but the same conditions apply also for the best control of rust mite and red spiders.

Nicotine Applications

In aphid control plenty of nicotine must be present in the dust mixture. Experimental work has shown that 3 per cent of actual 100 per cent nicotine (which is equivalent to 7½ per cent of nicotine sulphate since this is only a 40 per cent solution of nicotine) is the most effective nicotine content. Nicotine dust kills, for the most part, through nicotine fumes liberated by the dust and an atmosphere saturated with nicotine fumes must be maintained about the insect long enough to insure a kill. Either too rapid or slow liberation of nicotine fumes reduces the efficiency of the material. The rate of this evolution is determined largely by the character and combination of the absorbant and filler material in the dust, and so the proper combination of these is of the utmost importance.

Because of this rapid liberation of nicotine fumes, together with the penetrating properties of the dust cloud, aphis are killed in curled up leaves where it would otherwise be extremely difficult to control them.

Nicotine dust applications can be repeated also without injury to the trees when later infestation makes this necessary. Applications of oil in combination with other materials in spray form for aphis control cannot be repeated as frequently, as is sometimes needed, without danger of injury. Nicotine dust applications are thus useful to supplement the use of such a spray where the grower desires to make an oil and nicotine spray for aphis control.

A quiet atmosphere is essential for successful grove dusting with nicotine dust. The material is extremely light and in order that the most satisfactory dust cloud be secured it is important that there be practically a dead calm. No one need expect to get good results from the use of nicotine dust when there is even a moderate wind blowing. Most growers with large groves dust when there is no breeze in late evening or night to secure the most economical use of their materials. A dust cloud will persist longer under these conditions and give the greatest returns on the purchase price. It is probable too that whatever nicotine is not liberated as a gas will combine with dew falling on the tree and act as does the same material in spray form.

A high temperature too is desirable for the best use of nicotine dust. In late evening there seems to be an accumulation of the heat of the day and the insects are breathing more rapidly than they would be in early morning also. Thus late evening conditions all combine to constitute the most favorable conditions for the use of nicotine dust.

Sulphur Applications

The efficiency of sulphur dust for rust mite and red spider control is directly proportional to its fineness. The more finely and uniformly ground materials will cover a greater acreage, spread through the trees more thoroughly, and coat fruit and leaves with a more complete and uniform dust film than will a coarser material. Greater adherence to the leaves is secured with the finer material also. Furthermore, this finely ground material is no more expensive on an acre basis than is the coarse since less poundage is required per tree. The greater persistance and uniformly better results secured with the finer ground materials make it's use less expensive also.

A small proportion of lime in a sulphur dust mixture causes it to flow through the machine more readily, prevents lumping, and in the amounts ordinarily used in no way reduces the insecticidal value of the mixture.

Sulphur dust applications for rust mite and red spider control can, as mentioned earlier, be made under conditions less favorable for dusting than is the case with nicotine dust. Many growers owning large acreages dust all day long when there is little or no breeze. However, in view of the advantages which growers have seen this season in late evening dusting with nicotine dust it is probable that an increasing number of growers still prefer this time for making sulphur dust applications also. Dusting in this cooler part of the day is certainly easier on both men and teams. Under ordinary conditions too late evening applications of sulphur dust have eighteen or more hours of favorable weather conditions for action on rust mite and red spiders before showers occur. This time for making sulphur dust applications seems to possess certain real advantages worthy of serious consideration by growers.

Common Sense Dusting Pays.

Florida growers are now so familiar with dusting and the dust method that little further need be said regarding it. Growers apperciate readily after using or seeing a duster in use, and the dust cloud and kill of aphis or rust mite which follows a proper application, that dust penetrates throughout a tree and covers all particles of it. Insamuch too as one can dust from six to ten acres of grove per hour the saving in labor and ability to make timely applications is evident. No grower should expect satisfactory results with either inferior materials or careless applications of dust any more than he should with the same sort of spraying. Common sense dusting, however, is a practice which will lighten the growers work and give increased profits whenever practiced.

Experiment Station Bulletin 174 gives all available information on the control of the citrus aphis. Grove owners troubled with this pest should write at once to the Director, Experiment Station, Gainesville, for a free copy.

"Ain't that pretty? If I could put up fruit like that, I'd - - - - " and she was gone. That is part of the remark a certain lady was heard to make to her husband at the South Florida Fair, as she viewed a beautiful exhibit of canned products. If she had been in girls' or women's club work she could have learned to put up fruit just as attractively.

The Present Status of the Citrus Scab Fungus=A Recent Discovery

By May E. Lambert, Orlando, Florida

The Department of Agriculture has carried on investigations of citrus scab almost continuously during the forty years that the disease has been known in this country. Much praiseworthy and splendid work has been done. Each investigator in turn put forth his best efforts to discover the natural relationships of the causal organism of the disease. It was well known to them that any sound, remedial measures must in the final analysis be based upon a knowledge of the behavior and relationships of the causal organism.

Recently it was announced in the Journal of Phytopathology, Vol. 15, No. 2, page 99, February, 1915 that Miss Anna E. Jenkins, a pathologist in the Bureau of Plant Industry, has discovered the true nature of the fungus which causes citrus scab. This article outlines the relationships of the fungus and it gives a technical description of it in all its forms so that future investigators will have no trouble in doing further work with the organism causing the disease. There are also published several photographs and drawings illustrattive of the work done.

The article above mentioned gives a brief report of the results of Miss Jenkins' studies and observations over a number of years during which time detailed study of the fungus has been made. This has included a careful study of the fungus with a compound microscope, observations of its habits of growth in test tubes in the laboratory, coupled with a study of the fungus as it occurs on citrus. In this paper it is pointed out that the citrus scab organism is closely related to the fungus which causes grape anthracnose, a disease well known to Florida growers interested in grape culture. The similarity of these two organisms had not previously been suspected, and no other fungus had been shown to be related to either one. But, in connection with this work, it has also been learned that the causal fungus of raspberry anthracnose, one of the most important diseases of bramble fruits, must be considered as a near relative of these two fungi.

Grape anthracnose, raspberry anthracnose and citrus scab were first observed in America between 1880 and 1885. Although each disease has been considered unique, and the hosts reported for all three are unrelated, the resemblance of the organisms and in many respects the similarity of the diseases which they produce, as first shown by Miss Jenkins, are at once apparent. A good deal of investigation has been done on all three plant diseases of their respective hosts. A knowlegde of the relationship of these fungi, all plant pathogenes and very destructive in their nature, will serve as a key to a large store of valuable information accumulated over a long period of years. This, when correlated and interpreted in the light of the information given in Miss Jenkins' recent contribution, cannot help but have an important bearing on many phases of all three diseases and their control.

Miss Jenkins has been in the state since early in the year devoting practically all of her time to a close-up study of the citrus scab fungus under natural conditions. Her findings here have certainly put an entirely different light upon the disease giving us additional information on the behavior of the causal fungus that had not been suspected in the past. For although the cause of citrus scab has been known for many years, some of the important phases of its behavior have not been known and the absence of this information has led to erroneous assumptions, especially in regard to infection periods and control measures. To illustrate this point, most fungi require a day or more for production of spores in quantity and several hours of the most favorable conditions for spore germination—not so with the citrus scab fungus. It can produce millions of spores within a very few hours and they can germinate in a small fraction of an hour. There are other equally important findings. The work cannot but have a direct bearing upon the practical control of citrus scab. Miss Jenkins' recent findings are now being repeated for further verification and will be published in detail in the near future.

The Department of Agriculture should be congratulated in persevering over such a long period of time until the exact nature of the organism causing citrus scab was discovered, and Miss Jenkins also deserves the congratulations of the citrus growers of Florida for accomplishing this most excellent piece of work.

BUREAU OF CHEMISTRY DEVISES NEW CITRUS PECTIN METHOD

Thousands of tons of residue from the manufacture of citrus by-products are discarded each year. According to the United States Department of Agriculture, from 1.5 to 3 per cent of such residue, depending upon the ripeness of the fruit, is pectin, a valuable constituent for use in the manufacture of jellies of all kinds. Realizing the great possibilities of turning this waste product into profit, the Bureau of Chemistry undertook a study to devise methods of recovering the pectin from the lemon, orange, and grapefruit residue.

The principal source of pectin for commercial use in making jellies and marmalades, has been apple pomace from vinegar factories. The simple method of producing pectin from apple pomace was not applicable to the citrus by-products, however. The oils and bitter principle in citrus peel impart a disagreeable bitter taste to the product, making it necessary to either remove them or precipitate the pectin from the solution. In the course of the study a successful method for producing the citrus pectin on a commerciel scale was evolved. The results of the study and the methods used are discussed in Department Bulletin 1322, just issued by the United States Department of Agriculture, Washington, D. C. A copy may be secured upon request as long as the supply lasts by writing to the department.

A Kentucky judge says he is going to stop all gossiping within his jurisdiction. That man delights in hunting trouble.

The Citrus Industry

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GROVE CALENDAR FOR APRIL

Timely Suggestions for Grove Work During the Present Month

Continue frequent cultivations.

Watch for rust mites, particularly on grapefruit; if found in numbers, spray or dust with sulphur immediately.

Be on the watch for the new citrus aphis. This pest is present throughout the belt, and where present, active steps should be taken at once to eradicate it.

Spray peaches with "self-boiled" lime sulphur (8-8-50) and lead arsenate to control brown rot and curculio.

Continue clean cultivation of pecans with disc harrow.

STATE HORTICULTURAL MEETING

The Thirty-Eighth Annual Session of the Florida State Horticultural Society is in session at Eustis as this issue of The Citrus Industry goes to its readers. The annual meetings of this Society have ever been of interest and benefit to the horticulturists of Florida, and especially to citrus growers, as by far the greater interest in these meetings has always centered about citrus, the leading industry of the state. That the session this year will be fully up to the usual high standard, there can be no doubt.

President L. B. Skinner, Secretary Bayard F. Floyd, and their associates and committees have arranged a program of unusual merit and one which will attract the attention of every horticulturist in the state. Papers by leading men in horticulture have been prepared and every indication points to a meeting of more than usual merit.

The town of Eustis, situated among the lakes and hills of Lake county and in the very center of many large citrus developments and a citrus growing section famed for the excellence of its production, has done everything possible to aid the officers of the Society in their efforts to make the 1925 session one of unsurpassed interest and value.

The citrus growers of the state owe much to the Florida State Horticultural Society and to the present officers, who have been indefatigible in their endeavors to bring about a betterment of conditions in the horticultural field.

BRIGHT FRUIT

Ever since its establishment, more than five years ago, The Citrus Industry has recognized the desirability; nay, the imperative necessity of improving the appearance of Florida citrus fruits if the grower is to receive that share of prosperity to which the intrinsic worth of his product entitles him.

It is comparatively easy for the Florida grower of citrus fruit to produce sweet and juicy fruit. Nature, through soil and climatic conditions, aids him in this direction. No citrus producing section of the world produces sweeter, more juicy fruit than Florida. But, on the other hand, nature, by very reason of that unmatched climate with which she has blessed Florida, has placed the citrus growers of the state under a handicap by loading his trees with bugs which operate to prevent the easy production of clean, bright fruit. To overcome this handicap, the grower must be forever on his guard. He cannot for one instant relax his diligence if he would win the battle against the enemies which thrive so wonderfully beneath the sunny skies of Florida.

Recognizing the importance of this problem to the growers of the state, The Citrus Industry is devoting a large part of its space this month to the study of this problem. Men high in counsels of this industry, in scientific research, in actual grove practice, in marketing and commercial lines, have been called upon to give the results of their experiences, their experiments and their observations for the benefit of the readers of this magazine.

We have endeavored to cover every branch of the subject and we are quite certain that never before has a single issue of any publication contained so much of importance to the grower who is seeking to produce cleaner, brighter fruit, as will be found in the columns of this issue of The Citrus Industry. We believe that the articles carried in this issue are of sufficient value and importance to justify the filing of the magazine for future reference and careful study. If the articles printed in this issue shall have the effect of bringing about the production of a greater percentage of clean, bright citrus fruit in the groves of Florida, we shall feel that the effort has been well spent.

A NEW DEPARTMENT

The Citrus Industry has arranged with Mr. R. E. Lenfest, entomologist and citrus expert, to conduct a citrus problem department in this

magazine. The first of Mr. Lenfest's articles appears elsewhere in this issue, and we are confident that this department will prove of great interest and incalculable benefit to the readers of The Citrus Industry.

Mr. Lenfest is well known to the citrus growers of Florida and is recognized as one of the very best authorities in the state on all matters pertaining to horticulture and particularly to problems of citrus culture. His services and advice have been eagerly sought by commercial concerns and by individual growers, and where his advice has been followed it has been uniformly to the advantage of the growers.

It has ever been the purpose of The Citrus Industry to serve the citrus growers of the state in every way possible, and in the best manner possible, and we feel confident that in securing the co-operation of Mr. Lenfest to handle this important department of the magazine that a long step in the furtherance of this purpose has been taken.

THE MANUFACTURING OPPORTUNITIES OF FLORIDA

Reprinted from Manufacturers Record, Issue of March 12, 1925.

Every part of the South from Maryland to Texas, with the exception of Florida, has long been known as furnishing unsurpassed opportunities for manufacturing. Florida, on the contrary, has somehow come to be regarded almost wholly as a state of oranges, grapefruit and early vegetables, and of a superb climate. Few people seem to have appreciated the fact that Florida has also industrial possibilities. Writing on this point to the Manufacturers Record, L. L. Richardson, a Massachusetts manufacturer for thirty years, says:

"What is still a rather unknown quantity in the North is the ideal conditions for manufacturing in Florida. I have been a manufacturer in Massachusetts for the past 30 years, but have been in Florida now for the past six winters, and I believe the success of many manufacturing plants is as easy to secure here as in the North.

"By inducing people of the North to come to Florida and by showing them what and how to manufacture, the Manufacturers Record can build Florida and the Southern states to an unbelievable size."

For 42 years this paper has been seeking to turn the attention of the people of the North and West to the South, and to the limitless opportunities of that entire section. Only occasionally, however, has it stressed the importance of Florida's potentialities for manufacturing, for Florida people themselves have been rather loath to believe in its advantages for manufacturing; indeed, we have constantly heard from Florida people that its future depended solely upon the tourist business, agriculture and climate.

Most of the railroad officials have taken this same view but here is a Massachusetts manufacturer, now thoroughly familiar with Florida who thinks the advantages for manufacturing in Florida are fully as great as in any other section—indeed, he claims that the conditions in that state are ideal for manufacturing. It may take some little time to drive this point home to the people of the country, but it is pre-eminently desirable that Florida itself should begin to study this phase of its possibilities.

It would be an extremely desirable thing if the state legislature would pass a bill authorizing the Governor and other state officials to have an industrial survey of Florida undertaken by some one of a great number of experts who have made this line of work a business for many years.

Suppose, for instance, some one of these firms was authorized to investigate Florida from the extreme northern limit to the extreme southern limit, from the Atlantic Ocean to the Gulf side, and make a report which would show the exact conditions in every part of the state for mineral and industrial development. We venture to say that if this were done it would bring about an industrial development in that state which would astonish its own people.

Florida should not rest content on the tourist business, on land development, on citrus fruits and early vegetables, or on its climate, or on all combined. Its resources for manufacture should be thoroughly investigated, and when these have been made known a campaign should be inaugurated to develop industries which have demonstrated the possibility of success in various lines.

Of course, the lumber business and phosphate interests are widely known, but who knows what may be the possibilities of using the peat beds of the state for the manufacture of gas and the development of electric power therefrom? Who knows how many things are beneath the surface, little dreamed of at present? Who knows what particular lines of industry the soft, balmy climate of this state, based on its location and its proximity to ocean and gulf, and innumerable lakes within its borders, might be established here? Here is a campaign for all the people of the state.

Industrial development would greatly enhance the intrinsic value of Florida real estate, it would furnish a basis for a healthy increase of population, and would give employment to thousands of young men and young women unable now to find industrial employment except to a limited extent.

Bearing directly on this line of thought is a letter just received from Lleier & O'Donnell of Miami, who write:

"What we have found neglected in Florida is the development of the natural resources of the state. No state can go ahead very far unless actual development takes place. We are enclosing you a report of a deposit of clay that we have located in Florida and believe it will save the state millions of dollars each year."

Every day brings forth new evidence that the natural resources of Florida for industrial and mineral development must be sought out and made known. Florida's tremendous boom will have in it some danger of temporary reaction unless there is promptly created a foundation of industrial development to give employment to thousands of people.

Injury to Orchard Trees by Termites or "White Ants"

By Thos. E. Synder, Entomologist, Bureau of Entomology,
U. S. Department of Agriculture

Termites or "white ants" are native insects and are widely distributed throughout the United States, where 40 species occur. However, these destructive insects are more numerous and injurious in the southern, southwestern and Pacific Coast regions.

Classification

These so-called white ants are not true ants, although they are superficially ant-like, live in colonies made up of different forms or castes, and

Fig. 1. Winged, colonizing adults of a common subterranean termite of eastern United States. (RETICULITERMES FLAVIPES Kol.)

are social insects. In these nests or colonies both wingless and winged mature individuals are produced. The brownish or blackish, elongate, slender, ant-like, colonizing, sexual adults (Fig. 1 and 2) with long wings, un-

Fig. 2. Winged, colonizing adult of a non-subterranean termite (KALOTERMES SCHWARTKI Banks) of Florida.

like the other forms, have functional eyes and are able to endure full sunlight. These migratory males and females appear normally once a year, and only during a short period.

Location of Colonies or Nests; Habitat

The nests of some of termites (1) are in the earth and wood; trees are attacked by the workers only through the ground; they are of subterranean habit, while the nests of other species are excavated in the wood of logs, stumps, poles, posts, boards, etc., as well as in trees by the winged forms, since there are no workers, and they do not live in the ground.

With the clearing of land and consequent destruction of their natural breeding places in forests in dead trees, decaying stumps and logs, termites have become increasingly destructive to the wood-work of buildings and material stored therein, tel-

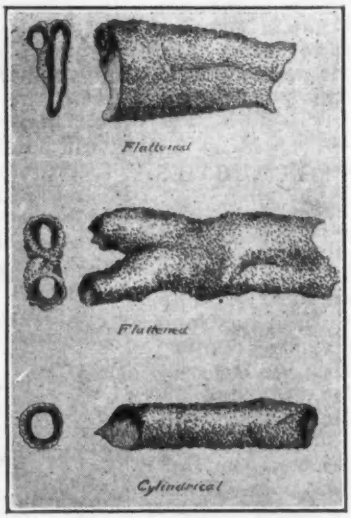

Fig. 3. Shelter tubes built by a common subterranean termite of eastern United States. (RETICULITERMES FLAVIPES Kol.)

ephone poles, fences, or any timber in contact with the ground, as well as to living vegetation—not only fruit nut, and shade trees, shrubs, and flowers, but also to truck and field crops

Fig. 4. Worker of a common subterranean termite of eastern United States. (RETICULITERMES FLAVIPES Kol.) .

and grape vines in California. The principal food of termites is cellulose, which they obtain from either dead or living vegetation.

Habits

Termites in the United States are mainly species of subterranean or wood-boring habit and are not as spectacular, nor, of course as common as the mound or carton making, or tree nesting termites of the Tropics. Very few termites in this country have conspicuous habits or come above ground out into the sunlight, except during the annual colonizing

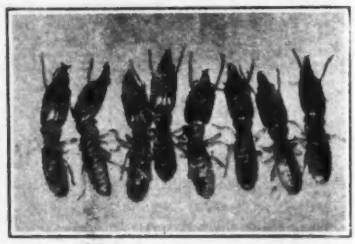

Fig. 5. Soldiers of a common subterranean termite of eastern United States. (RETICULITERMES FLAVIPES Kol.).

swarm and hence largely escape notice until they become injurious.

Termites Which Are Subterranean in Habit

Subterranean termites live in for-

Fig. 6. Soldier of a non-subterranean termite (KALOTERMES APPROXIMATUS Snyder) of southeastern United States.

ests, building their nests in the wood, in cleared land, in any wood in contact with the ground, or in the plains in a labyrinth of underground passages in the earth usually underneath wood or vegetation

Since termites are soft-bodied, they always conceal themselves within the wood, in the earth, or within their earth-like, cartou, shelter tubes (Fig.3) The grayish-white soft-bodied wingless workers (Fig. 4) are in reality the destructive form. These workers make the exca

1. RETICULITERMES Holmgren, LEUCOTERMES Silvestri and AMITERMES Silvestri, etc.

2. KELOTERMES Hagen, NEOTERMES Holmgren and CRYPTOTERMES Banks, etc.

vations, enlarge and extend the colony as this becomes necessary. They live underground or within the wood, are blind and shun the light—therefore, are rarely seen. In burrowing through wood workers often completely honeycomb it, usually following the grain and eating out the softer, thin-walled, larger-celled spring or new wood. They are able to penetrate the hardest of woods, provided there is access to moisture in the ground. Another sterile caste the "soldiers" (Fig. 5 and 6) assist in defending the colony against invaders.

Subterranean species carry moisture with them in extending their galleries in wood and vegetation by means of moist excrement mixed with earth.

Termites Non-Subterranean in Habitat

Non-subterranean termites, which are injurious, attack wood directly and, instead of following the grain, excavate longitudinal chambers

Fig. 7. Burrows in dead tree of non-subterranean termite in the southeastern United States. (KALOTERMES HUBBARDI Banks.

through it. (Fig. 7) The sexual adults after they have lost their wings and the young or nymphs are the destructive forms. Their pellets excrement (Fig. 8) are regularly impressed and these sometimes completely fill or block up the burrows with a compact mass; they are often expelled as dry droppings from the infested wood—an indication of infestation. These termites are destructive to the woodwork and furniture in buildings, poles, posts, etc., as well as to living trees. Apparently they can exist without the great amount of moisture necessary to the life of termites subterranean in habit.

The Colonizing Swarm

At certain seasons the winged, sexual individuals migrate in large numbers from the parent nests to found

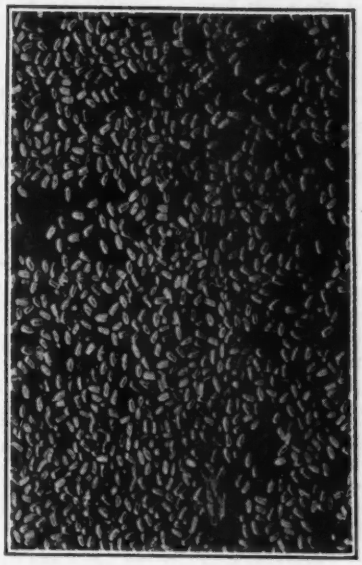

Fig. 8. Pellets of excrement expelled from wood by non-subterranean termites (KALOTERMES spp.).

new colonies. (Fig. 9) The season during which swarming takes place varies with the species and the geographical locality, usually occurring in the spring or fall. After this flight, the winged forms lose their wings and the males and females establish new colonies. In the case of the subterranean termites, wood and trees are usually attacked indirectly through the ground — although sometimes they enter trees under loose bark due to sun burn, etc., scars or borer holes, provided there is sufficient moisture present. Non-subterranean termites attack the wood directly, or in the case of trees directly through wounds, borer holes or under loose bark; moisture is NOT necessary.

The eggs are laid, young develop and in a few years increase in numbers and are able to feed and care

Fig. 9. Colonizing flight or "swarm" of a common eastern subterranean termite (RETICULITERMES FLAVIPES Kol.).

for the reproductive forms—the "king" and "queen" (Fig. 10)—and the soldiers which protect the colony from insect and other enemies, notably the true ants.

The Reproductive Forms

The delated female or queen enlarges in size due to the increasing number of eggs that develop but never loses the power of locomotion. It was once believed that, since the queen mother was the source of the colony life, if she were destroyed the termite colony would be exterminated. This, of course, has been disproved by more recent studies. Several different types of reproductive forms occur in addition to the winged forms that lose their wings—forms with wing pads (brachypterous) and wingless (anterous) reproductive adults. The forms which have shed their wings, however, are the normal type and occur as a single pair, whereas there may be hundreds of the other forms heading colonies. The reproductive forms with wing pads and the wingless type usually have but little color to the body; the eyes are reduced and they rarely come above ground or leave the burrows in the wood.

The location of the queens in the

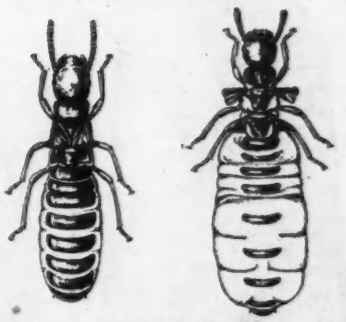

Fig. 10. Male (b) and female (a) or king and queen of a common subterranean termite (RETICULITERMES FLAVIPES Kol.).

colony will depend upon the season of the year. In the case of subterranean termites, the colony will burrow deeply below ground or to a lesser depth under stones, cow chips, etc., during periods of intense heat or drought in the plains or in arid or prairie regions or below the frost line during winter in colder climates. These termites are always able to migrate when conditions are unfavorable. The non-subterranean termites are not able to leave the wood in which they have excavated their nests.

Injury to Orchard Trees

Termites occasionally seriously injure a great variety of living trees and shrubs. In Florida, they have caused considerable damage to newly planted groves of orange trees by eat-

ing away the bark about the collar and root and completely girdling the trees. Similar damage has been recorded to other fruit trees, such as lemon, avocado (Fig. 11), apple (Fig. 12 and 13), pear, peach, apricot, plum, cherry, and guava, especially in the southern states and in California, but also, even in the central western states. Orchards of pecan (Fig. 14), chestnut and walnut trees are likewise injured, the insects infesting the roots and the heartwood at or near the base of injured trees. Sometime the infested trees are plastered with earth-like tubes or shelter galleries leading up from the ground (Fig. 3) These insects cannot bear light and, therefore, can be driven from any tree they have attacked by scraping away the earth and leaving the parts where the termites are attacking exposed.

This injury by termites is most common to 1 to 3 year old nursery stock. In the case of subterranean termites, the injury is almost entirely below ground, although the excavations made by the termites occassionally extend above the surface of the soil inside of the trunk of the tree. Below ground, the trees are frequently hollowed out until little more than a shell of bark remains.

This injury is more common in recently cleared woodland or in cultivated fields where the stubble of field crops has been ploughed under and is rotting in the earth.

In the case of nursery stock, the insects make their entrance to the trees at some point below ground, the place most frequently chosen, in the case of pecan stock, being the point where the tap-root has been cut to cause it to branch out into a larger root system. From this point of entrance the insects work upward, extending their galleries through the wood and enlarging them until the heart of the tree at the crown is entirely eaten away.

Usually, the affected trees do not show any indication of injury until they are damaged beyond remedy and then they die very quickly, the leaves sometimes suddenly wilting on the limbs within a period of three or four days. Such trees should be immediately removed and the soil given chemical treatment before another tree is planted to replace it in this spot.

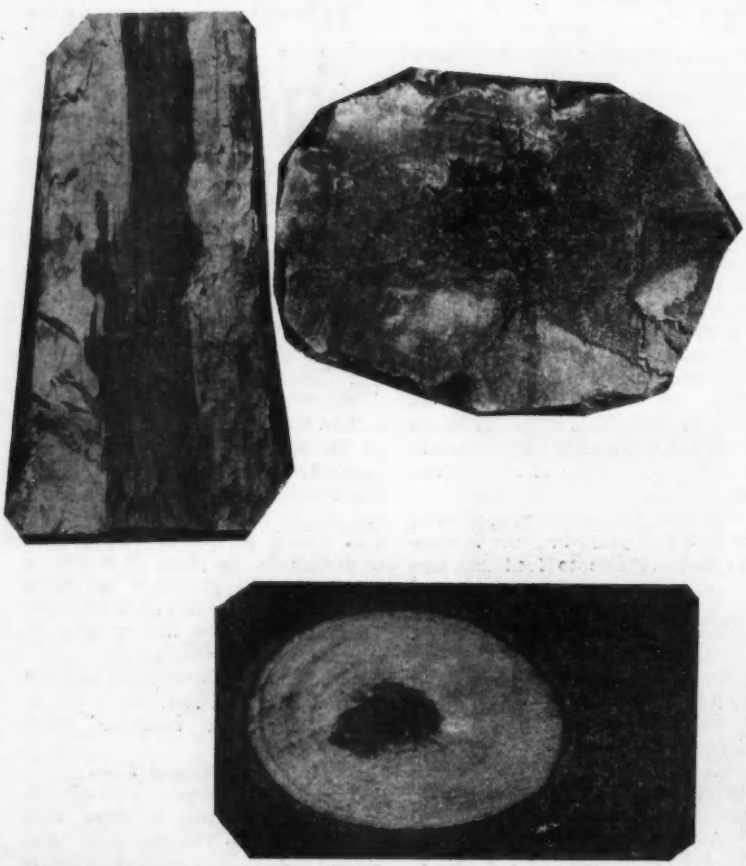

Fig. 11. Avocado tree killed by a subterranean termite in the Canal Zone, Panama. "a" and "b" show damaged trunk "c" shows living branch bored by the termites.

Avoid Planting in Recently Cleared Woodland.

Such injury by termites to young orchard nursery stock is much more common in the new soil of recently cleared woodland containing old decaying stumps, other wood, or much humus. Such debris, in which the insects breed, should be removed. In general, the use of recently cleared land should be avoided in planting nursery stock. In the case of the pecan, it is recommended that two or three cereal crops be grown on newly cleared land before the young trees are set out. Deep fall plowing should be of value in breaking up subteranean galleries and nests of termites.

It is usually only during the first few years in the life of orange groves or fruit orchards that trouble may be expected from subterranean termites, because newly cleared land then contains more or less rotting wood. As the material disappears, the termites normally gradually leave or die out.

Poisoning the Soil

After breaking up the soil, the ground can be treated with calcium cyanide, (1 oz. per gallon water) to kill the insects; several applications may be necessary.

Care in Banking.

In orange groves in Florida, it is customary for many owners of young groves, particularly in the northern part of the citrus belt, to bank their young trees as a precaution against losing the bud if the winter is severe. It is important that the earth used for banking be as free as possible from rotten wood, otherwise subterranean termites may attack the banked trees. If rotten wood is piled about the trunk of the trees in banking them, there is danger that the termites will extend their galleries through the earth from this material (after it has been consumed) and forced by hunger to attack the bark of the trees. Young trees are frequently entirely girdled and killed in this manner.

Care of Windbreaks.

Rows of shade trees used as windbreaks about orchards or groves should receive care; broken or pruned branches should be removed or burned—such wood serves as breeding places for termites, which are a source of danger to the fruit trees.

Carlessly Piled Fuel Wood.

Where wood piled in an orange grove for heating purposes is not used, it is frequently thrown around the base of the trees to get it out of the way. It rots and becomes

heavily infested with termites. Such wood should be kept as far from the trees as possible and removed or burned if it becomes rotten.

Treat Fence Posts with Creosote.

When untreated fence posts surround the orchard or grove, the posts should be given preservative treatments with coal tar creosote, since otherwise they serve as breeding places for termites and will also decay and need replacing.

Fig. 12. Apple seedlings killed by a subterranean termite at Wellington, Kansas.

Care in Pruning.

Careless pruning, so that strips of dead wood are left in the trees, is also liable to attract termites. After this dead wood has been consumed, they attack the bark of the living tree. Great care should be taken in pruning operations; all dead or diseased limbs should be brushed with a creosote—coal tar mixture (1-4 creasote, 3-4 coal tar). This mixture should not be allowed to come in contact with the living tissues at the edges of the bark; here a shellac should be applied. Prunings should be burned promptly, and not be left lying on the ground.

Cover Scars or Wounds.

Care should be taken that the trees do not become scarred near the base, in order to prevent subsequent infestation by termites. Scars should be covered with grafting wax, or if large, brushed with coal tar mixture and creosote. Clean forest, orchard, and horticultural management is to be recommended. Properly executed tree surgery sometimes may be effective in repairing damage to valuable old trees. Remove and burn any dead and dying infested trees.

Care of Weakened Stock.

Fruit tree nursery stock is usually attacked at a scar, where the roots have been injured or cut off, or at a graft, as clear-graft apple stock; apparently they attack grafted trees at the point where the graft has not healed over smoothly with the seedling stock. Care should be taken not to allow the roots to dry out before planting, they should be "heeled in" in muck; such weakened stock is liable to attack. Do not set young trees much, if any, deeper than they stood in the nursery rows, otherwise they are liable to be attacked.

Avoid the Use of Animal Manure.

Heavily manured soil will attract subterranean termites, since they can obtain food from the manure; commercial fertilizers, rather than stable manure, are recommended in regions where termites are common in the soil.

Pick up Fallen Fruit.

Fallen fruit on the ground, especially pears, are attacked where subterranean termites are numerous in the soil; this is due to the fact that pears contain desirable food.

Remedies

The removal and burning of breeding places in wood near orchards.

In the case of subterranean termites, deep fall plowing is recommended to break up the labyrinth of underground tunnels about the roots.

Pruning or proper methods of tree surgery will prevent or remedy attack by wood-boring termites, especially if the injury is exposed. Where the bark and living tissue have been eaten away, if the tree has enough life above and below, it can be saved by bridge-grafting.

In the case of valuable infested trees which are not yet dying, subterranean termites can be killed in the soil, if the soil is moist and not compact, by breaking it up near the tree and pouring carbon disulphid on the earth at a distance of about 1 foot from the trunk, then covering the liquid over with earth. The gas from this liquid being heavier than air will penetrate the subterranean galleries of the termites. Since this gas is somewhat dangerous to plant life, very large dosages should not be used. Care should be taken in handling this volatile, inflammable and explosive fluid, and the fumes should not be inhaled. There are indications that an emulsion of carbon disulphid may prove more effective; it is likewise poured on the broken up earth near the base of the trees but not nearer than 1 foot. Carbon tetrachloride can be similarly used, but is apparently not as effective in killing these insects.

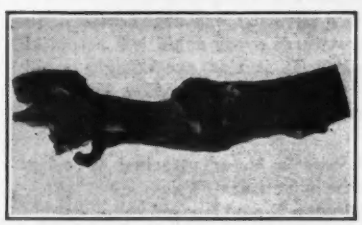

Fig. 13. Root of an apple tree killed by a subterranean termite (RETICULITERMES sp.) at Moran, Okla.

Similar experiments are also being conducted with crystals of paradichlorobenzene and the liquid orthodichlorobenzene to kill termites in the earth, both in this country and in the Canal Zone, Panama.

The gasses from these insecticides will not rise upward and where tree trunks or branches are infested poisonous liquids must be used; such liquids are kerosene emulsion poisoned with sodium arsenite (8), solutions of calcium syanide, (one ounce per gal. water) and orthodichlorobenzine; they must not be permitted to come in contact with living tissue.

Fig. 14. Pecan nursery stock killed at Wortham, Miss., by a common subterranean termite of eastern United States. (RETICULITERMES FLAVIPES Kol.).

Summary.

Termites of two different types

Continued on page 36

The New Citrus Aphid

By J. R. Watson, Entomologist, Florida Experiment Station, Gainesville.

This new insect which descended upon the citrus industry "out of the blue" about two years ago, is undoubtedly a pest of major importance, indeed the worst new insect which has struck citrus in Florida for generations. Just the manner in which it originated as a citrus pest cannot be stated, and probably never can be. However, all new evidence seems to point to its identity with the apple aphis of the north, APHIS POMI, which has been known as a pest of apples, pears, etc. for many years. Later, Miss Patch of the Maine Experiment Station, named an aphis which she found on spiraea, APHIS SPIRAECOLA. Miss Patch and others who have studied the insect closely are now convinced that it is identical with the apple aphid.

This, however, does not clear up the mystery of its origin as a citrus pest. All indications point to spiraea as the native host plant from which it spread to apple, and later to citrus. Spiraea has been in Florida for many years. APHIS POMI was taken in Gainesville ten years ago on apple. Why did it not occur on our citrus trees long ago? Two explanations would seems possible—one that it did not find our citrus until just recently, and the other that it has recently developed a strain that took to citrus, in other words, that it has changed its feeding habits. To the writer the latter guess seems the most probable. We know that insects do change their food habits and will sometimes take to feeding on plants on which they have never fed before. The most plausible explanation of the origin would seem to be that a number of years ago, at least four or five, the insects, perhaps a single female, took to citrus and was able to live on it. From this small beginning the pest increased in numbers until two years ago when it became numerous enough to attract our attention, tho it was not until a year ago that we identified it as different from the old melon aphis.

Our reason for thinking its native host plant is spiraea is that it can live on spiraea thruout the entire year. In the north it lays eggs on spiraea in the fall and thus carries the species over thru the winter. It has never been observed to lay eggs on citrus and as is well known, can feed only on the young and tender growth of the citrus, whereas on spiraea it can feed on the mature growth and also stems. Several years ago there was quite an extensive planting of spiraea on postoffice grounds in Florida, and it is possible that the change of food plants occurred at this time.

The insect probably has a slight preference for citrus of the Mandarin type, including tangerines, King and Temple oranges. Our experience has been that these varieties are much more liable to attack than others, but this may not be due so much to a natural preference of the insect for these varieties as to their habits of growth. Probably the Temple orange is attacked chiefly because it is more or less in continual growth. An inspection of the original tree in Winter Park a few days ago by the writer and W. W. Yothers revealed the fact that it was little more severely infested than the surrounding Valencias, and in proportion to the new growth it was carrying, very little if any more. Tangerines suffer more than round oranges because they are later in putting out and consequently when they do put out there are more aphids to attack them.

Life Histroy

Like all aphids, the insect breeds with surprising rapidity, four days being sufficient for a generation in the summer time, and even in the colder weather of winter the period is not more than twice as great. Except during the very coldest months, from the last of November to February, no males are produced and no eggs are laid, the young being brought forth alive by mature females. In other words every aphid is a potential mother. It is this exceedingly rapid multiplication which makes the aphid such a very dangerous pest.

Enemies

Citrus aphis is attacked by most of the parasites and predators which feed upon the melon and other aphids in Florida. Perhaps the most important of these are the larvae of syrphus flies. These are legless grubs which can be seen feeding in most any colony of aphids. They occur all winter long on citrus leaves but are not nearly as common during the winter time as later in the season. There are several species of these syrphus flies. After the syrphus flies the most efficient predators are lady beetles. Named in the probable order of their importance as feeders on the aphids they are the Covergent, the Blood-Red, SCYMUS, the Twice-Stabbed, the Two-Spotted, and the Austrailian lady beetle. The lady beetles are even scarcer than the syrphus fly larvae during the winter time, but increase as the weather gets warmer.

Unfortunately, a little wasp like insect which is one of the most efficient checks of the melon aphis, apparently is unable to complete its development in the new citrus aphid. The eggs are laid in the aphid, the young grub develops and kills the aphid, but for some reason or other the grub itself dies in the body of the aphid. The inability of this wasp-like parasite to complete its development in the new citrus aphid is undoubtedly one of the reasons why it is such a severe pest on citrus, whereas the melon aphis is a pest of minor importance.

The enemies which have brought the pest under control during the last two summers and undoubtedly will do so again this summer are of vegetable origin, at least one of which is a fungus. Tho these can be found in small numbers in the colonies of aphids during the year it seems to require the humidity and high temperature of the rainy season to start an epidemic.

Doubtless as the years go by these parasites, both insect and vegetable, will gradually reduce the severity of the infestation of the citrus aphid, as has been the case with the whitefly and purple scale, but it may be a matter of ten years or more before this equilibrium is established.

Control Of The Pest

Tho the new citrus aphid is a very great pest it can be fought at a cost within reason, and citrus growers need not feel especially despondent over its ravages. However, the control of this pest calls for intelligent active and timely measures. Keeping down the aphid is no job for a careless, unintelligent or procrastinating grower. The logical time to begin to fight the aphis for next year is this fall. A very important point is to throw the trees into as complete dormancy as is possible next winter. This applies particularly to young trees. The aphid is primarily a pest of young trees. Avoid stimulating an undue amount of growth during the winter by heavy applications of fertilizer in the fall, particularly those containing a high percentage of quickly available ammonia. In other words, cut down the ammonia in the fall fertilizer, particularly on young trees, to as low a

point as is consistent with health of the trees. Of course one should not starve his young trees to the point of injury. Avoid cultivation of the grove late in the fall. In other words, take all measures to keep the trees as dormant as possible during the winter. When a sporadic sprout appears on a young tree during the winter as will sometimes happen, it would be an excellent idea to cut it off. The new aphis, as far as citrus is concerned, can live only on the young and tender foliage, and if young and tender foliage is lacking they can be starved out. As a part of this program destroy all spiraea in citrus communities. The most commonly planted species of spiraea is Bridal Wreath. Tho the percentage of aphids that wintered over on spiraea this past winter was small in comparison with those that wintered over on citrus, the spiraea was in some communities alone responsible for carrying over the pest. As pointed out above the insect can feed on the mature foliage of spiraea and does not have to have new growth. The citrus industry of Florida is too valuable to be jeopardized by the presence of spiraea, no matter how ornamental it may be.

When growth does start in the spring in spite of the grower's efforts to hold it back, it should be rushed along, by applications of quickly available nitrogen, and cultivation. Of course one following this program must keep in mind the danger of frost injury. However, we seldom have a frost severe enough to materially injure citrus trees after the latter part of February in the main citrus belt, and probably the grower can safely begin this cultivation and fertilization by the middle of February in most sections. The idea of this is to force out the growth and get as large a growth as possible on the young trees before the aphids get abundant enough to do material damage.

All thru winter the grower should watch his trees carefully for small colonies of aphids. Most of these will be on the very young trees. It is the writer's experience that the most effective method of dealing with these small colonies is to dip them in an insecticide. For this purpose place a gallon or two of water in a bucket, or better yet a shallow, wide pan. Dissolve in the water a teaspoonful of nicotine sulphate and a couple of ounces of soap, whale oil or laundry soap for each gallon of water. With this bucket go down the rows of trees and bend over and dip into the bucket every infested twig. This should be done every week or ten days during the colder part of the winter, and as spring comes on probably twice a week. Where this has been persistently and thoroly done during the past season, aphid injury has been practically eliminated from young groves at a trifling cost. Some sprouts will be found that cannot very well be dipped because of their position. These should either be washed with a sponge or broken off and dropped into the insecticide, or spot dusted.

A very good way would be to go over the grove twice a week, the first time dipping all infested twigs found and the second time spot dusting. These two methods go well together because twigs which are most difficult to dust, namely those out on the ends of the branches, are the ones most easily dipped, and vice versa, those dipped with greatest difficulty, namely those in the interior of the tree, are those that can be dusted most efficiently. An ideal way in large groves would be for the men to work in gangs, three or four men dipping and dusting. When a man sees a branch he cannot very well dip he can call the man with the dusting machine. On the larger trees, say three or four years old, as the aphids get more numerous this dipping will become less practical.

In that case spot dusting will be the proper procedure. To be effective this spot dusting should start early in the season. In fact it should be carried on all winter, and it must be thoro. At least 99 percent of the aphids must be found and killed. The dust most recommended for this spot dusting is three percent nicotine sulphate lime dust. This will not ordinarily kill the larvae of the syrphus flies and the lady beetles. Tests recently carried out by The Assistant Entomologist of the Experiment Station, A. H. Beyer, show that these larvae can live as long as four days without aphids. This means that they have four days in which to hunt up a colony of aphids which may be missed by the duster. In four days these larvae can cover considerable space. This dusting to be effective must be done in calm weather. Dusting in any considerable wind is sure to result in an inefficient killing or in a needless waste of dust. This spot dusting should not be undertaken at night as it is impossible to see the colonies of aphids, and it should not be left to careless or inefficient help. The most careful man available should be put at this work, and he should have good eyesight so as to be able to detect the infested twigs at a glance. During the winter time the dusting should be done in the middle of the day when it is good and warm, but as spring comes on in late February or March, it can be done in the early morning, when the atmosphere is more apt to be calm. It is not necessary to wait for the trees to be dry. Indeed dew seems make the dusting more efficient as is sticks better on the trees. If these measures are carefully and thoroly taken it is our experience that they will be sufficient to hold the aphids in check in groves planted on high pine land. By high pine land I mean rolling, hilly country where the long-leaved pine and turkey oaks are the predominating trees. I do not refer to spruce pine or scrub land. On such soils if the aphids are prevented from heavily infesting the young trees, it is our experience that they will not become sufficiently abundant to seriously interfere with large bearing trees. We mean trees ten years old or older. Such trees are completely dormant in the winter time and when they come out in the spring, unless there are heavily infested young trees about from which the aphids can fly to them, the aphids will not have time to thoroly infest these large trees before the growth has hardened to a point where damage will not be severe. But if the young trees in a neighborhood are allowed to become infested, the infestation may become so severe on the old bearing trees that control measures will be necessary.

In that case spot dusting will be the method of dealing with the pest, and the cheapest in the long run is dusting with a power duster with nicotine sulphate lime dusts, mentioned above. In groves dusted with good power duster on a perfectly calm day or at night, the writer has been unable to find a single live aphid. Indeed in some cases there has been a 90 percent kill on trees ten or twelve rows beyond the dusted portion. The cost of this procedure was from four to six cents per tree for the dust alone. This is by all means the most effective method of dealing with the aphids in large bearing groves. But to do efficient work almost absolute calm is essential. For this reason much of this grove dusting has been done at night. If the aphids are kept down on the surrounding young trees the experience of the past spring has been that one dusting is sufficient to carry a large bearing tree thru. Even when surrounded by trees from which the large trees can be reinfested, it will ordinarily be two weeks before the aphids will become suf-

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The Story of an Insect Pest

By E. W. Berger, Entomologist, State Plant Board

HISTORICAL

When the writer came to the state in the spring of 1906 as Entomologist for the Florida Experiment Station, the principal whitefly infesting citrus was spoken of as the Citrus Whitefly and designated by the scientific name, ALEYRODES CITRI. It developed by the fall and winter of 1907-1908, that this supposed single species really consisted of two. It being apparent that the published description of the so-called Citrus Whitefly referred only to one of the two species, namely the one with the smooth eggs, and this also being the most common one it was called the Common Whitefly, the scientific name (ALEYRADES CITRI) having been applied to this species. The second species, with cloudy area on each wing, was called the * Cloudy-Winged Whitefly and given the scientific name, NUBIFERA (cloud-bearing). The Common Whitefly has a large number of host plants, citrus being its principal host in Florida. The Cloudy-Winged Whitefly, on the other hand, has only citrus and a few species of rubber for its hosts. The rubbers however, unlike citrus, have so far never been found heavily infested.

It may not be out of place here to state briefly that the Common Whitefly undoubtedly had its origin in India or south-eastern Asia, and is known to be present there now, as well as in China and Japan. Whether it was carried directly from Aisia to the United States, or indirectly from some other locality as a way-station will probably never be known. The Cloudy-Winged Whitefly is known to occur only in the U. S., Cuba, and Mexico.

There is now a third species of whitefly occasionally found heavily infesting citrus trees in Florida, this is known as the Wooly Whitefly (ALEUROTRIXUS HOWARDI). As this species rarely requires artificial treatment, being almost perfectly controlled before the end of each summer by a minute wasp-like parasite, I shall not further refer to it in this paper. This also applies to several other species of whiteflies only occasionally found in small numbers on citrus.

Without going into details, citrus trees were already becoming severely infested with whitefly in the 70's of the last century. It is also probably true that the two species referred to in the first paragraph were both present at that time. They certainly were present by 1893 (in Florida and in Louisiana) as at least two papers, published at that time, used illustrations made indiscriminately from each species.

A number of investigators (several not entomologists) have taken part in solving this rather perplexing entomological problem, each one contributing more or less in his time The list believed to be quite complete, mainly in chronological order, follows: Wm. H. Ashmead*, C. V. Riley* L. O. Howard, H. G. Hubbard*, Jos. Voyle*, H. J. Webber, A. L. Quaintance, P. H. Rolfs, H. A. Gossard, E. H. Sellards, H. S. Fawcett, E. W. Berger, A. W. Morrill, E. A. Back, W. W. Yothers, R. S. Woglum, and J. R. Watson. It would hardly be possible to prepare a satisfactory list of the many citrus growers, and perhaps some others, who assisted by reporting their observations or by trying out methods of control either on their own initiative or at the suggestion of entomologists. I cannot resist, however, from giving the names of two growers who are occasionally mentioned in the older literature: namely, C. H. Foster and A. J. Pettigrew, both of Manatee County.

The Problem Solved

At the risk of appearing presumptive, it is the writer's belief that the problem of the control of the two principal whiteflies infesting citrus trees in Florida has been solved. In making this statement it is hoped that no one will imply that all the work has been done for the grower, and that there is no whitefly problem left for him. The point is that the whitefly problem has been solved like that of the weeds. Whenever weeds get too abundant or tall, every tiller of the soil, whether he cultivates a seed bed or grove, knows the remedy (hoeing, cultivating, plowing, or mowing). Likewise every well informed citrus grower (and if he is not well informed he can become well informed) knows exactly what to do and when to do it in order to control the whitefly. Spray in fall, i. e. during late September, October, or Nevember; spray in April or May, if necessary; introduce a friendly fungus during the period of summer rains.)

I would repeat "That the problem of control of the two principal whiteflies infesting citrus in Florida has been solved", notwithstanding the statement a few years ago, of a professional entomologist, to the effect that no entomological problem had been so completely solved that the investigators could hand their conclusions or recommendations to the Extension Entomologist, County Demonstration Agents, or growers, with the postscript, FINIS. I believe that this is exactly what has been done in this instance and the results embodied in "A SPRAY SCHEDULE FOR CITRUS", constructed at a gathering of several entomologists and plant pathologists at Orlando on February 27, 1919. This SPRAY SCHEDULE, last printed as Bulletin 30 by the Agricultural Extension Division, University of Florida, Gainesville, has been revised twice, but the recommendations for the control of the whiteflies still stand as originally printed. The problem has been solved and there is no further excuse that citrus groves in Florida should be allowed to get out of condition and the fruit injured by excessive infestations of whiteflies (or scale-insects.)

From this it does not follow that improvements cannot be made, because there is nothing so perfect but that at least a few finishing touches will sooner or later be added by somebody.

Up Against The Problem

The writer's first introduction (Apr. 27, 1906) to the so-called Citrus Whitefly, together with two of its natural enemies, namely the Red Aschersonia, or Red Whitefly-Fungus, and the Brown Whitefly-Fungus, was on the grounds of the Experiment Station while this was still located at Lake City. Professor P. H. Rolfs, at that time the Director, led the writer to some orange trees, and without much ado stated the whitefly problem and the particular trend that would probably have to be followed in its solution. He further advised that the solution of this problem would probably be the writer's prin-

* Without going into details, but for the benefit of any who may wish to gather correct technical data from this paper, it should be stated that a revision of the family of insects to which the so-called whiteflies belong, has resulted in the following classification: Common Whitefly (Dialeurodes citri); Cloudy-winged Whitefly (Dialeurodes citrifolii). NUBIFERA thus became a synonym of CITRIFOLII. The revision was made by ento mologists of the Bureau of Entomology, U. S. Department of Agriculture.

It may also be explained that the term WHITEFLY, as applied to the ALEYRODIDAE, or mealy-wings as they were once called, is a misnomer. These insects are not flies because they have four wings in the adult stage, whereas flies proper have only two wings. The immature stages (larvae and pupa) of whiteflies are wingless.

* Deceased

cipal work during a number of years.

At that time the two fungi named in the preceding paragraph were the principal known parasites or natural enemies of the whitefly. The Yellow Aschersonia, or Yellow Whitefly-Fungus, a parasite only of the Cloudy-Winged Whitefly, was recognized as a distinct species by Professor Rolfs himself a few years later. This seeming digression on the natural enemies of the whitefly in this paragraph will be better understood after having read the next section. Professor Rolfs was, and still is, a strong believer in the control of insect pests by means of their natural enemies, and better beknown to himself than to the writer at that time, knew why he was directing him to give special attention toward increasing the usefulness of these natural enemies.

Spray and Fumigation in Disrepute

Spraying with kerosene emulsions, resin wash and several other sprays that had been invented about that time had been recommended and undertaken by different growers and in different localities with varied success, but as a whole, spraying was pronounced a failure and in disrepute. Fumigation with hydrocyanic acid gas under tents had also been tried out by the Experiment Station, and earlier by investigators of the U. S. Department of Agriculture.

During the spring and summer of 1906, when the writer took up entomological work in Florida, a compulsory spraying law had become effective in Orange County, and it was planned to spray the whole county during that summer and thus reduce the whitefly. Perhaps some even thought of eradication, a word which the writer rarely uses, always preferring to use the word control, since, of course, eradication, in almost every instance, is out of the question after a pest had become so widely disseminated as the whiteflies infesting citrus were at that time. While the writer did not have occasion to see any of the spraying operations conducted that summer in Orange County, accounts of the work have been given him by men who were engaged in it and what a total failure the outcome was. Several power sprayers were bought, I do not recall the number, and spraying was started apparently in a haphazard way, most of the sprayers probably believing that the thicker the whiteflies on the wing the better the time to spray, which, of course, was all wrong. The point in this paragraph, however, is simply this: it would have been futile after that time for anyone to have undertaken a propaganda for the purpose of popularizing spraying, as growers had tried it and found it wanting. The whole difficulty, of course was that no one had persistently and emphatically indicated the proper time at which spraying for the whitefly should be done, and, of course, the writer himself could not then have indicated it.

Whatever may have been the real conditions back of the situation as it prevailed in 1906, whether the cause of failure were psychological (failure on the part of growers to get down to business), unsatisfactory spray solutions, inadequate machinery, a wrong spray schedule or no spray schedule at all, the fact remains that the minds of growers were boiling over on the subject of whitefly control and resolutions seeking assistance from the U. S. D. A., and the Experiment Station had been passed. This resulted in a reinvestigation of the subject by the Experiment Station, a preliminary resume of which has already been given. The Bureau of Entomology, under the Direction of Dr. A. W. Morrill, at Orlando. Dr. Morrill and his several associates (See also section on "FUMIGATION TRIED AGAIN") gave splendid account of themselves, their investigation and data, notwithstanding the fact that their extended and thorough investigation, like two previous ones, failed to put over fumigation as an accepted method of insect control for Florida.

The Fungus Parasites Recommended

Tho perhaps only vaguely conscious of the situation, as already stated, it now appears that there was only one logical course to pursue, namely, to indicate the use of the Red Whitefly-Fungus and the Brown Whitefly-Fungus. The writer's problem, therefore, not only consisted in noting the general effect, or usefulness, of these fungi in the control of whiteflies under natural conditions, but he soon started experiments in an endeavor to artificially spread them. As it was an easy matter to obtain the spores of the Red Aschersonia, which are produced in endless millions and billions, it was also easily conceived that this fungus might be started by pinning & tying leaves having fungus material, into trees where it was desired to start fungus, or by making a mixture of fungus spores and water, and thus starting growths of fungus by simply spraying this mixture into other trees. Both methods were successful and the results were written up in Bulletins 88, 97, and later 193. The method of spreading fungus by transplanting small trees having fungus, among grove trees having no fungus, had been successfully practiced since the early 90's for both of the fungi named. There are also earlier records of the leaf-pinning method being employed. The spores of the Brown Whitefly-Fungus not having been discovered at that time, the chance method of pinning leaves and planting trees continued to be recommended.

Growing Fungus Parasites

It appears that I should digress a bit here from the regular subject and refer to some work done by Dr. H. S. Fawcett, at that time (1908) Plant Pathologist at the Florida Experiment Station, who was successful in artificially growing the Red Aschersonia and also the Yellow Aschersonia, which had been discovered by that time, on pieces of sterilized sweet potato. Using Dr. Fawcett's method, the writer soon succeeded in growing larger cultures of these fungi in pint, wide-mouthed bottles, and in considerable numbers. The cultures were tried out and found effective in successfully starting growths of fungus in whitefly-infested trees. While at that time there was practically no demand for pure cultures of fungus, this demand, however, arose later, about 1915, after canker had been discovered in the state and it had become apparent to those in charge of the canker eradication work that pure cultures for starting fungus in trees were a desiratum, since otherwise growers might accidently get hold of material infested with canker. The work of growing pure cultures of the entomogenous fungi, principally the Red Aschersonia and Yellow Aschersonia, was taken up rather extensively by the Entomological Department of the State Plant Board in 1916, and since that time hundreds and sometimes several thousands of these cultures have been produced annually and furnished to growers at the nominal cost of 75c per culture, with directions for application. A culture is sufficient for about one acre of trees.

Fungi Not Always Satisfactory

After the writer had been at work on the whitefly for several years it became apparent that the fungi did not always give satisfactory control. This was occasionally true in groves on high pine land, also in groves out of condition and in groves of young trees (three years old or younger), especially during the seasons when there was not sufficient moisture for the proper development of the fungi. It should be added here that the entomogenous fungi in Florida thrive best during the period of summer

rains, which may occur from the middle of May or June to the middle or end of September. However, during some years there may be a shortage of rain during this period, if not in all parts of Florida, at least in certain localities. All this naturally would retard the development of the fungi, thus allowing the whiteflies to increase. It therefore became apparent to the writer that spraying, at least after the period of summer rains had passed and after the fungi had had their chance, would be an important additional control measure.

Spraying With Oil Emulsions And Soaps Found Effective

Spraying experiments with soap and with one or two proprietary brands of sprays soon disclosed that if spraying was started ten days or two weeks after the so-called, white gnats, as the winged adult whiteflies are sometimes called, had nearly or wholly disappeared, that very effective killing of the young larvae could be done, even with rather weak soap solutions, such as one pound of soap to eight gallons of water, but that older larvae (30-40 days) were less effectively killed. The writer, therefore, rather urgently, (whenever he had the opportunity, by letter, bulletin, and otherwise) encouraged correspondents to do some spraying against the whiteflies infesting citrus, but always to plan their spraying so that the application of the sprays could be made beginning ten days or two weeks after the adult whiteflies had nearly or wholly disappeared from the wing. As the eggs are not effectively destroyed by insecticides, this ten days or two weeks allows time for the eggs to hatch and, as already explained, the younger larvae are easily destroyed.

The invitation and placing upon the market of two or three proprietary sprays containing a heavy oil, about this time, together with the accompaning propaganda by the manufacturers, also encouraged growers to resume spraying.

The writer is aware that others, before his time, have recommended spraying after the eggs have hatched, namely during the larval periods, and advised that spraying against the winged adult insects is useless. The periods of the year during which the two principal larval broods can be most effectively destroyed by spraying were also indicated. Why growers should not at once have more generally responded to these recommendations is something of a mystery, but probably due to a psychological condition. Growers had heretofore found it necessary to do but little if any spraying and were therefore not easily convinced, especially as the friendly fungi were giving a fair degree of commercial control. Unsatisfactory, messy, or expensive sprays may also have been factors. Then, too, the recommendations may not have have been in an impressive manner.

A Spray Schedule

There are two main periods in the year when spraying is most effective; namely, in spring (some time in April or May, ten days or two weeks after the disappearance or near disappearance of the spring brood of adult whiteflies), and then again in fall (during the latter part of September or October, but rarely later than December), following the disappearance of the third or fall brood of adult whiteflies. Because the summer and fall broods, and because during the summer time, beginning some time in May or June and continuing through the middle of September, is the period of summer rains, we do not urge growers to use insecticides, because rains are likely to interfere and it is difficult to find any time when only a few or no adult whiteflies are present. It is also at that time that the entomogenous fungi generally do such effective work, hence, we always urge growers to apply fungus at that time, unless, of course, their groves are well supplied with it, when nature will generally take care of the spreading. Only in extreme instances, in which severely infested trees need immediate attention, would we urge spraying during the period of summer rains.

Real Progress

It should be apparent that we were making real progress by this time (1909 & 1910) and were crystalizing the problem into a comparatively few works of recommendation. While the writer believes that this primitive spray schedule was largely revived by himself, he does not in any way wish to minimize the much good work done by other investigators. For instance, the life history of the whitefly, a correct konwledge of which was absolutely necessary when it came to indicating anything like a spray schedule, had been previously worked out by others. The writer wishes here also to particularly refer to the splendid work done by W. W Yothers in the laboratory of the Bureau of Entomology at Orlando, Florida. Mr. Yothers perfected several formulas for making oil emulsions so that each grower could make his own, whether he needed only a few gallons or barrels of it. The writer has always spoken of these formulas as Yother's formulas, of which there are several. The first ones were mixed cold and used rather large quantities of soap, but with the increase in price of fish-oil soap, Mr. Yothers produced other formulas requiring less soap, but which require the heating of the mixtures in order to make the emulsions. Mr. Yothers has also carried on extensive spraying experiments and has contributed much valuable information toward the solution of the whitefly problem.

Fumigation Tried Again

As already indicated, during the summer of 1906, the Bureau of Entomology, U. S. D. A., established its laboratory at Orlando, in charge of Dr. A. W. Morrill, who later had associated with him Dr. E. A. Back, Mr. W. W. Yothers, and several others. The earlier experiments conducted there were with hydrocyanic acid gas, in an endeavor to perfect or adapt the fumigation method of insect control, so useful in California, to Florida conditions, and especially to the control of whiteflies infesting citrus. However, while effective fumigation on account of whiteflies (also scale-insects) found infesting citrus in Florida, was possible, certain factors have militated against its becoming an established method. These untoward factors may be summarized as follows: Night work, too short a period (Dec., Jan., Feb.), conflict with picking season, danger of injury to fruit, heavy dews, winds.

Applying The Schedule

Such has been the development of this problem. On the richer soils, generally spoken of as hammock, which in their native state are generally covered with hard wood forests or palmettos, many growers even today do no spraying with insecticides. In other words, the several entomogenous fungi satisfactorily control not only the whiteflies but also the scale-insects. The rust mite and mealybugs are also generally controlled by fungi recently discovered by Dr. A. T. Speare, who spent some time in Florida at the Orlando Laboratory of the Bureau of Entomology a few years ago. While, as indicated, some citrus growers with groves on the richer soils, or hammock lands, omit spraying altogether, others, especially those with groves on the higher and drier lands, may give one spraying during early fall if necessary, preferably during the latter part of September or October, as a final clean-up for the season, while those who omit the fall spraying may give the spring spraying in April or May.

Continued on page 36

W. R. O'Neal President James L. Giles Secretary

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The First Bond & Mortgage Co. is owned and managed by officers and directors who have had long experience in Investment Banking in Florida, dealing exclusively in First Mortgage Securities—

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Following is a reproduction of a the rotogravure section of the N ing what the American Fru Gr ther the consumption of Florid markets.

Only six years ago the American Fruit Growers Inc., inaugurated a system of scientific grading, packing and marketing thereby establishing a new standard of excellence for grapefruit and oranges to the consuming public of the world.

This leadership became recognized, and has been continuously maintained, because no matter what conditions were the efficiency of the organization marketing BLUE GOOSE fruits proved equal to winning through them the merit due superiority.

There is no secret to success, it is simply expert knowledge of the situation to be mastered and using that knowledge properly to the greatest advantage. This organization has specialized in men who know the situation both in Florida and the consuming markets. These men have used to the greatest possible advantage their expert knowledge and thus have maintained the success established by BLUE GOOSE.

The American Fruit Growers Inc., through its extensive representation both in the United States and other countries has made history by the standard of excellence of the fruit branded BLUE GOOSE and the perfect adaptability of the sales force in every market they have entered.

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BLUE GOOSE grapefruit
exhilarating juice you ev
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To be sure that you
look for the name 'Blue
skin. That's our best qu
fruit from selected groves
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American Fruit

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of Florida fruits in the northern

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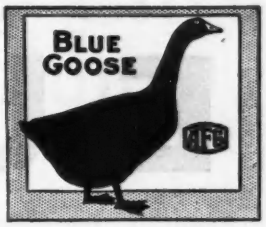
ulating juice

SE grapefruit are brimful of the most
juice you ever tasted. You'll marvel
efruit could hold so much.
re that you get this wonderful fruit,
e name "Blue Goose" branded on the
's our best quality mark put on grape-
elected groves—grown, picked, graded,
shipped under our exacting standards.

uit Growers Inc.

, : Florida



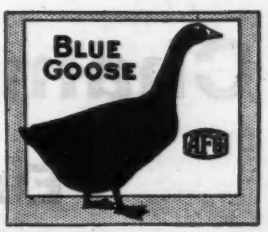
Thus after six seasons this organization today is recognized as the foremost producer of reliable earnings to the citrus growers of Florida.

Growers who use the American Fruit Growers Inc., marketing service share in the advantages to be derived from the extensive and unique advertising maintained by this organization.

BLUE GOOSE through this advertising, backed up by the quality of the fruit itself and the excellence of the grade and pack going out under this trade name, has come to mean "Uniformly the Best" to the wholesaler, retailer and to the consuming public. Through the branding of the trademark BLUE GOOSE on the skin of the fruit the public are assured that they are buying a standardized product.

Wholesalers and retailers are always more interested in buying an article sold under an advertised trade name. When the consumer begins to recognize a trade name supported by an article that can always be relied upon, naturally they are going to buy that product continuously.

Growers of better fruit are invited to investigate our service both in Florida and in the markets of this and other countries and to share in the advantages to be derived from marketing their good fruit in company with other good fruit.



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Reveals the Beauty, Charms and Glories of Florida

EUSTIS POPULATION HAS MORE THAN DOUBLED IN THE LAST FIVE YEARS.

REAL ESTATE SALES DURING THE LAST FEW MONTHS FORECAST A SUBSTANTIAL AND ROCK BOTTOM OPPORTUNITY FOR INVESTMENTS. CAPITALISTS ARE TURNING THEIR EYES TO EUSTIS—

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Chamber of Commerce

Eustis : Florida

Controlling the New Citrus Aphis With Calcium Cyanide

By R. W. Kelley, Southern Entomologist, American Cyanamid Company

The new citrus aphis which made its first appearance in Florida a year ago, and caused such consternation among grove owners, is back in full force this year, and has already done a great deal of damage to the new growth.

There are still many growers who do not realize the seriousness of this pest, and are just a little inclined to let it take care of itself. These people are hurting both themselves and their neighbors, for they will not only lose their own fruit and new growth and eventually their groves, but their trees serve as breeding places for aphids from which they will fly over and attack the trees of those neighbors, who have taken steps to control the insects.

It has been suggested that it will not be long before the State will pass a law compelling growers to dust and dust carefully for the control of the new aphis. So serious, in fact, do the State authorities consider this pest as a menace to the citrus industry, that they have appropriated a very considerable sum of money to study its life history, natural enemies, and methods of artificial control.

A staff of scientists is already at work in the new and thoroughly modern entomological laboratory at Lake Alfred, making careful studies under the microscope of the life history and biology of the citrus aphis, and the natural enemies and parasites, which prey upon it.

In the demonstration groves at Lake Alfred and Lakeland, the field force under the direction of Prof. A. H. Beyer of Gainesville, equipped with dusting and spraying machinery, is busily engaged in testing out various materials and methods of application, and checking the degree of control obtained with each.

While these tests are not yet complete, it has been pretty definitely established that a 100 per cent kill of aphis can be obtained with calcium cyanide, when applied under tents, and a practical control when dusted in the open.

There is one point that everybody who has had anything to do with the citrus aphis is agreed on, and that is that thoroughness of application is absolutely necessary to obtain a satisfactory kill. This insect is not a pest that can be controlled by ordinary slipshod methods, and unless the grower is prepared to dust carefully and thoroughly, following the directions carefully, he cannot expect a control. This little insect is such a rapid breeder that unless a kill nearly approaching 100 per cent is obtained at each application, the aphids which survive the treatment will multiply in a few days to many times their number, and reinfest the trees. The greater the kill, the less heavy the reinfestation. The habit of bearing its young alive is accountable for the rapidity with which the aphis increases in number.

The use of calcium cyanide as an insecticide is not new. It has been used for years in the North on the apple aphis and Pear Psyllo with great success, and the fumigation of citrus trees with hydrocyanic acid gas (which calcium cynaide generates) has been a common practice in California for fifteen or twenty years. Some scientific authorities believe that the new citrus aphis is closely related to, if not absolutely identical with the apple aphis of the North, which is being controlled with calcium cyanide.

The killing action of calcium cyanide on the aphis is almost instantaneous. It does not simply stupify the insects, as some other dusts do, but once they have been exposed to its actions they do not recover, to come back and reinfest the trees. In using calcium cyanide dust, as with any new product, directions should be carefully followed. There is a mistaken idea on the part of some growers who have not used calcium cyanide that it is dangerous to handle. Perhaps the word "cyanide" frightens them.

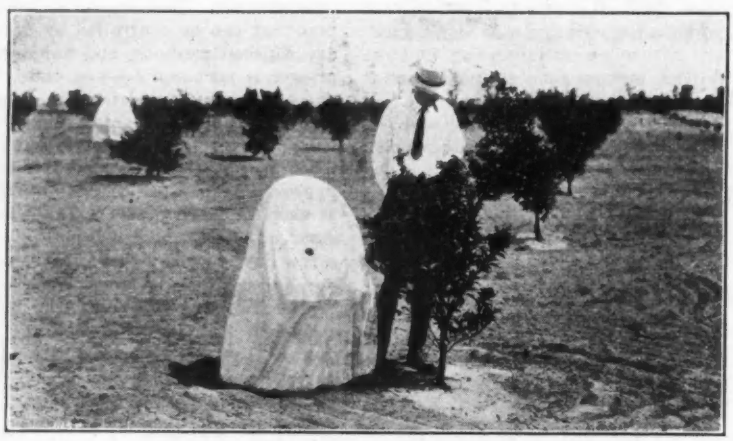
There is no foundation in fact for this belief, however, for calcium cyanide, if used according to directions, is no more dangerous than any other insecticide. They are all poisonous and reasonable care must be exercised, but we could not get along without them, and obtain marketable

Using Calcium Cyanide with power duster.

fruit.

Hundreds of thousands of pounds of calcium cyanide have been used in the orchards of the North, and many thousand pounds used here in Florida, without a single fatality having ever been reported. No company can afford to sell a really dangerous product for general use.

To obtain satisfactory results with any dust material, thorough and careful application is necessary. Calcium cyanide, in coming in contact with air gives off hydrocyanic acid gas, and it is the gas that does the killing. It is necessary for the gas to envelope the tree for a considerable time to do a thorough job, and therefore, open dusting should only be done on absolutely calm days, when the dust will cling around the tree, and not blow all over the grove. Many growers do their dusting from four o'clock in the afternoon until 10 at night or when it is generally calm, stopping before the dew begins to get heavy. Under conditions, and where foliage is heavy enough to "hold the gas," a kill approximately 100 per cent can be obtained, with either a hand or power duster. The amount needed for a grove of average 10 to 15 year old trees is about a quarter of a pound a tree or twenty-five pounds for an acre of 100 trees. At present prices, this would cost about four dollars an acre, or fifty cents an acre less than most prepared dusts.



Gassing tents in young citrus grove

As regards the possibility of burning the foliage, there is absolutely none if the calcium cyanide is applied according to directions. Tests have been made under extreme conditions of temperature and humidity and unless the leaves were already wet with rain or dew, or the application was made just before a rain there was no injury to the foliage. Calcium cyanide when actually mixed with water does not readily give off hydrocyanic acid gas. but forms a solution of cyanide which is naturally injurious to leaves. The moisture normally present in the air, however, will release hydroncanic gas, from the calcium cyanide dust, and do no harm to the leaves, but is a very effective agent for killing insects. The residue remaining after the gas has been evolved is slacked

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Own a home midst hills and pretty lakes, in a land blessed with a year-round, healthful climate, where farmers market 2 and 3 crops annually, where people really live and prosper. It's yours for the making in Orange, Florida's "county bountiful."

Land $50 to $100 acre. Improved farms $1000 to $3000 acre. Live towns, good roads, schools, churches. Fruit, vegetable, poultry and general farming. Write now for illustrated booklet.

ORANGE COUNTY
CHAMBER OF COMMERCE
578 State Bank Bldg.
Orlando Florida

lime.

There is also an erroneous idea, which has gained currency in some quarters where calcium cyanide has not been demonstrated, that hydrocyanic acid gas will kill the predaceous enemies and parasites which prey on the new aphis and tend to keep it in check. In the first place the natural enemies of the aphis are not present in sufficient quantities to keep the aphis in anything like economic control, and there is little prospect that they will be for at least a few years to come.

Applying gas under tent

In the second place calcium cyanide will not kill these natural enemies, unless applied in quantities way in excess of what is necessary to kill the aphis. In California where fumigation with hydrocyanic acid gas under tents is the common method of controlling scale insects the operators test the concentration of gas by its effect on the lady beetle. When enough gas has been liberated to kill the lady beetle, they know there is enough to kill the scale.

Successful fumigation for the aphis does not require anywhere near as heavy a concentration of hydrocyanic acid gas as for fumigation for scale, so that there is no danger that the lady beetle and other insects which prey on the aphis, will be killed by calcium cyanide dusting for aphis control.

The problem of successfully combatting the citrus aphis has not been completely solved, and it may be that we will have to come to tent fumigation before we are through, as they do in California. This does not mean a great deal of expense as it is the small trees that are chiefly affected, and they do not require large tents. The older trees can be taken care of by dusting with a power duster, at such times as they are sending out flushes of new growth and aphids infestation is heavy. For the aphids are fastidious feeders and only young tender growth attracts them. For that reason, the greatest infestation is on the young trees, which are continually sending out new growth, and this tender new growth is vital to the tree.

It has been estimated by authorities that the new citrus aphid caused damage to the extent of four million dollars last year to the Citrus growers of Florida, and that we will have it with us for the next four or five years anyway. Therefore, it behooves us to go after it seriously and earnestly just as the State authorities are doing, and make every effort to keep it in check. It is a public duty on the part of every grower to dust his trees, besides being a very wise and businesslike thing to do for his own protection.

If calcium cyanide is used and applied properly the results on aphid control speak for themselves.

THAT EXTRA DOOR FOR "LIZZIE"

W. H. Anderson, of Reno, Nev., joining in the Pathfinder drive which is to force Ford to put two doors for the front seat of his flivver, instead of only one, drops into poetry thus:

Day by day,
In every way,
Hank thinks more and more
About that extra door,
For which he'll have to pay.

Old men are sometimes as vain as boys, even when they are intelligent. Just before he died, at eighty, Anatole France, urged to see some old friends, looked at himself in a mirror, and said, "Send them away, I am too ugly."

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SKINNER'S SPECIAL NICOTINE

Aphid Dust

An extra strength nicotine dust especially effective for the control of Aphids, Leaf Hoppers, Thrips, Squash Bugs, Flea Hoppers, White Fly, etc.
It is chemically treated to give off a stiffling, killing gas the minute it strikes the air. Gets 'em whether the dust has contact or not.
Skinner's Special Nicotine Aphid Dust is freshly made in our own chemical plant and comes to you full strength. Is packed in air tight steel drums.

Prices F. O. B. Dunedin

5 pound cans	$ 1.15	50 pound cans	$ 9.50
10 pound cans	2.25	100 pound cans	18.00
25 pound cans	5.25	150 pound cans	26.25
Feeney Hand Duster	20.00	With Flexible Connection	21.00

Write for Free Dusting Guide.—Dept. O.

Skinner Machinery Company

Chemical Dept. Dunedin, Florida.

UNITED STATES
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The United States Civil Service Commission announces the following open competitive examination:
Junior Agronomist—Junior Botanist—Junior Horticulturist—Junior Pathologist—Junior Physiologist—Junior Pomologist.

Receipt of applications for the positions named above will close May 9, 1925. The date for the assembling of competitors will be stated on the admission cards sent to applicants after the close of receipt of applications.

The examinations are to fill vacancies in the Department of Agriculture, at the entrance salary of $1,860 a year. Advancement in pay may be made without change in assignment up to $2,500 a year. Promotion to higher grades may be made in accordance with the civil service rules.

Applicants must have been graduated from a four years' course at a college or university of recognized standing, or be senior students in such an institution and furnish within six months from the date of the examination proof of actual graduation.

Competitors will be rated on practical questions; a thesis to be delivered to the examiner on the day of the examination; and education, training, and experience.

THE CITRUS INDUSTRY

A very important step toward the uniform numbering and marking of highways of interstate character was taken recently when Secretary of Agriculture Gore appointed a board to prepare a plan and secure its adoption by the various states. The board is composed of officials from the Bureau of Public Roads and a number of members of state highway departments.

"Do you act toward your wife as as you did before you married her?"

"Exactly. I remember just how I used to act when I first fell in love with her. I used to lean over the fence in front of her house and gaze at her shadow on the curtain, afraid to go in. And I act the same way now."

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Our Peace Valley Plantations are available at a reasonable price, and on an easy payment plan. We will plant your plantation with 2,000 Cavendish Banana Plants, care for it and market your crops.

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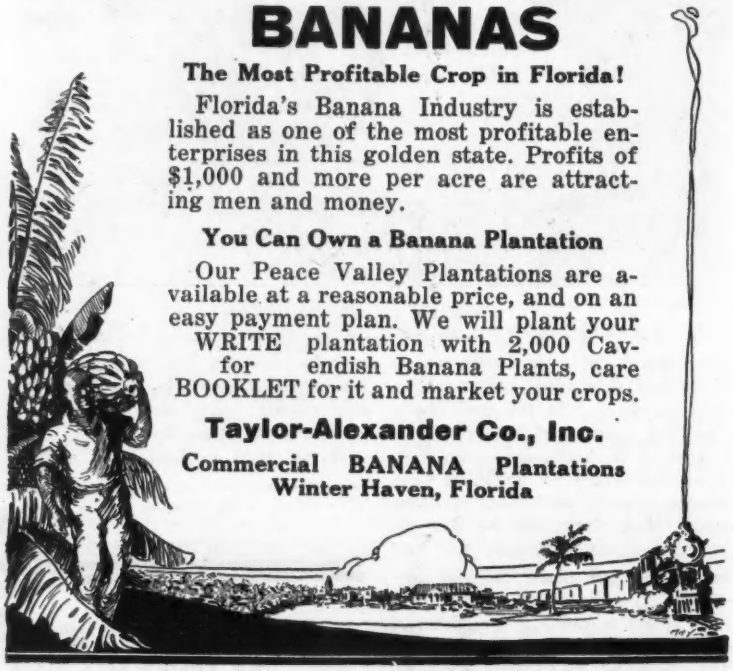

A Scarcity Of Bloom

is showing in many groves in the state. In many cases, it is the natural result of reduced applications of fertilizer during the spring and summer of 1924, or of the use of formulas carrying insufficient ammonia to give the trees a balanced food.

When the old crop is removed from the trees and the new fruit is small, growth in the trees should be encouraged. The summer application of fertilizer is particularly important for this purpose, and an early application is advantageous.

IDEAL BRANDS

are now being batched and cured in large quantities for this application and will be ready for early distribution. The assistance of a member of our staff for selecting the proper brand will be cheerfully given.

Wilson & Toomer Fertilizer Company

Ideal Fertilizers

Jacksonville **Florida**

"No nursery tree is a first-class tree unless budded from a bearing tree of a known quality and quantity of production."

Concerning Bright Fruit

SRPAYING is a very important factor, and should not be neglected. Bright fruit can only be protected by proper spraying and dusting.

HOWEVER the quality and texture of your fruit must not be neglected. This can be greatly improved by the proper use of good fertilizer.

BUT FIRST OF ALL, you must have first-class nursery stock. This combination, first-class nursery trees, good fertilizer, proper spraying and dusting, combined with your intellegent attention and cultivation, will produce for you fancy bright fruit that will be proper reward for your patience and labor.

WHEN YOU PLANT CITRUS TREES, be sure that they are OCKLAWAHA NURSERIES PEDIGREED TREES.

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Pedigreed Citrus Trees

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Make Your Own Bordeaux

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Florida Fruits and Flowers

Bartow, Fla.

THE NEW CITRUS APHID

Continued from page 19

ficiently abundant on the large trees to cause severe injury.

The cost of dusting can be cut almost in two if the grower will mix his own dust. Directions for doing this will be found in Bulletin 174 of the Experiment Station. Unfortunately some inferior dusts have been placed on the market in the last few weeks. Growers purchasing dusts should buy only those that are guaranteed to contain three percent nicotine sulphate, which will mean seven and a half percent of the 40 percent nicotine sulphate in lime.

In hammock groves, because of the more constant flush of growth on the trees the aphids present a more serious problem, one calling for more thoro and persistent work. On the other hand, dusting with a power duster is much easier in a hammock grove because the surrounding forest breaks the force of the wind and dusting will be possible on many days when it would not be in more open situations. Tangerines too, because they put out later will demand more drastic measures.

Fumigation

A very thoro way of killing out the aphids on comparatively young trees is fumigation under a tent. This has not been tried out very thoroly as yet, but it is probable that with the proper type of tent and a trained crew it can be done at a cost which will be well within the limits of reason. Our rather limited experience indicates that for dusting under a tent calcium cyanide is the most efficient insecticide. If done under proper weather conditions when it is comparatively dry and not too hot the danger of burning is not great.

Spraying

On trees where the foliage has not become badly curled spraying is an efficient way of controlling the citrus aphis, altho in general grove practice it has not given as thoro a kill as dusting on a calm day. Oil emulsions give a good kill if the aphids are thoroly wet but our experience would indicate that the kill is much better if nicotine sulphate, one part to 800 parts of water, is added. Unfortunately this greatly increases the cost of spray. Recent tests with compounds containing derris indicate that this is a very good insecticide when used alone or mixed with oil spray, tho it kills the aphis more slowly than the nicotine sulphate. This is not on the general market at the present time but probably will be another year. It should be considerably cheaper than the nicotine sulphate.

Combination Sprays

It is entirely practicable for the grower to combine the killing of the citrus aphis with that of other insects. One of these is thrips. In the power dusting mentioned above most of the thrips are killed on the side of the tree dusted but the kill is not great on the opposite side of the tree as the drifting dust does not penetrate the blossoms sufficiently. The lime sulphur and tobacco spray recommended for thrips is quite efficient against the new citrus aphis but it does not spread as well as a spray of soap and tobacco. When spraying for aphis alone the soap and tobacco is preferable. If delivered with sufficient force to penetrate the blossoms it will also be fairly good in killing the thrips. The addition of nicotine sulphate to the lime sulphur used for red spiders and rust mite will greatly increase the killing of the aphids.

Early May. is the standard time for spraying with oil emulsion for the control of scale insects and this will do much toward keeping down the aphids. If tobacco can be added to the oil emulsion it will make it even more effective.

How to Tell The New Citrus Aphid From Other Aphids

There are four species of aphids liable to be found on citrus. The new citrus aphid can be told from the others both by its color, the character of its work, and the absence of the wasp like parasite. The new citrus aphid is a uniform pea green during its early stages, almost the color of a citrus leaf. As it enters the pupa stage the head and the thorax turn a delicate pinkish brown and the dark wing pads are conspicuous. The winged adults have a black or very dark brown thorax, but the green color persists in the abdomen.

Next to the citrus aphis the melon aphis is probably most abundant on citrus. In the very young stages the melon aphis is much more yellow, and in the older stages it is a darker green, a more olive green. The winged adults are more uniform in color, the abdomen is not such a light green. The presence of the greatly swollen, brassy colored individuals with round hole in the top of the abdomen is another mark of the melon aphis.

Another common aphid on some varieties of citrus is TOXOPHERA AURANTI. This is a light yellowish brown in the older stages. This occurs on grapefruit as well as tangerines and oranges, and does not ordinarily curl the leaves much. The new citrus aphid, tho it is frequently found and sometimes in rather large numbers on grapefruit, does not ordinarily do a great deal of damage. Unless one fears that it will spread from the grapefruit to the oranges it probably can be largely neglected on grapefruit.

The common garden aphid is also sometimes found on citrus. This is much smaller species than the new citrus aphid.

"COULD BETTER FERTILIZER BE MADE WE WOULD MAKE IT"

Get January price list Mixed Fertilizers. "SIMON PURE and GEM BRANDS" now ready. QUALITY first, Fair prices. Also insecticides, sprayers, dusters and dusts. E. O. PAINTER FERTILIZER COMPANY, Jacksonville, Florida.

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Spray—
that your fruit
next season will run
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Eighth Floor Citrus Exchange Bldg.–Tampa, Florida

CITRUS COMMENTS

BY

R. E. Lenfest, Manager Horticultural Department
Orange County Citrus Sub-Exchange, Orlando

Aphids

Probably the most talked of citrus trouble just now is aphids. The situation regarding this pest calls for careful attention. No single plan for control will apply to all groves in all sections. Each grove is a problem in itself. It is not a question of whether or not the aphids can be killed. The question each grower wants answered is what to do to his own grove, or will it pay to do anything?

Following is an outline which may help growers answer this question. First and foremost the work must have a definite purpose in view and this purpose must be reasonable in its aim. In other words a grower should not attempt nor expect the impossible and at present it seems impossible to eradicate the aphids or entirely prevent damage.

In general there are three methods of attempting to secure control; Spraying, Dusting and Dipping.

Spraying must be thoroughly done, at high pressure and preferably with rods. There are four mixtures which have proved effective.

1st.—Oil emulsion 1 to 70 up to 1 to 90.

2nd.—Oil emulsion 1 to 70 up to 1 to 90 plus 4 lbs. fish oil soap per 100 gals.

3rd.—Oil emulsion at the above strengths plus 1 pint Black Leaf 40 per 100 gallons.

4th. 6 lbs. fish oil soap plus 1 pint Black Leaf 40 per 100 gallons

The first two are less expensive and have given at least fair results.

The last two seem to have given a little the best results under ordinary spraying methods. There are other combinations but these are the main ones.

Dusting is done with nicotine dusts and cyanide dusts. Reports regarding these dusts are so conflicting that it is hard to tell which is the better. Most reports agree that both dusts, if heavily applied to young growth, will show some burning but with reasonable care there should not be much, if any, damage.

Dipping the infested leaves in spraying solutions has given good results where the acreage is not large and the work is done carefully and regularly. At this stage of the fight for control this method is not often profitable.

What To Do.

If your trees are of bearing age and have set what seems to be a good crop it will hardly pay to try to keep the aphids from damaging some of the new growth. However it will pay to try to watch carefully to see that they do not later attack the fruit stems for if they do it will pay to start control measures.

If your trees are two to four years of age, with little or no fruit, and have made a good spring growth it will hardly pay to attempt control now unless the aphids are present in sufficient numbers to do very severe damage.

It is very important to give close attention to trees which are just now blooming or which may do so in the near future. This applies particularly to tangerine trees for many of them are just now putting out bloom and new growth. Where this condition exists it will pay to make a determined effort to control the aphids till the fruit is set and beyond danger. It will probably require either dusting or spraying every week till the fruit is set. A suggested plan would be that you thoroughly dust at once where bloom is just coming out. Then a week later spray thoroughly with the 4th formula above. If further treatment is necessary repeat the dust or spray at weekly intervals till the fruit is set and the danger point is passed. The main thing to keep in mind is not to damage the young growth or fruit.

It is just as important to watch young trees, particularly those just recently set. It will take very frequent dustings or sprayings or both to check the aphids sufficiently to allow the new growth to grow out far enough to keep the young trees alive. Some growers have thought that their young trees had not started yet and were poor trees when in reality they had started but the aphids had also begun work and the growth did not get out far enough to be seen except on close examination.

Main points. If fruit is well set don't worry if some new growth is damaged. If trees are just blooming, particularly tangerines, do all that you can to save the young fruit. If you have young trees, just set, give them a chance to put out some leaves to keep them alive. Keep weeds and grass down by cultivation and hoeing. The grower that boasts that he has done nothing and that his trees are better than where a good deal of work has been done is indeed fortunate in that he did not have as many aphids as others or that the growth of his trees was too far advanced for them to damage. Where the aphids are present and the growth is at the right stage there is no question of what they will do

There are several insects which feed on aphids but so far they have, in a measure, fallen down on the job and have not done a great deal of controlling. A fungus seems to attack these aphids during the rainy season, but during the dry, cool winter and spring months it does not seem to check the aphids very much.

Tree Conditions.

In many sections of the state tangerine and pineapple trees have reached the spring season in a very unthrifty condition. In some cases this has been due to scale injury, particularly on tangerines; in others the trees seem to be undernourished and in still others it is hard to settle on a definite cause. Often trees of these two varieties have been recently noted as being in poor condition while other varieties next to them or mixed in with them seem to be normal.

When these unthrifty conditions exist it seems best not to do a great deal of pruning till the trees have been started back toward normal and have made at least one good growth.

If nothing has been done to get these trees back to normal it would be advisable to use stable manure. If this cannot be secured the use of castor pomace will be helpful. In

Continued on page 36

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CITRUS COMMENTS

Continued from page 34

applying the castor pomace use at least half as many pounds of it as you use of commercial fertilizer at one application. Spread it evenly and carefully but not quite so wide as fertilizer should be spread for you are after rather quick but steady effect on the trees. Although this material carries 7 per cent ammonia it seems to have the effect on the trees of a high grade 4 per cent ammonia tree grower with reserve to carry them for some time. If the trees are actually undernourished this application should be made in addition to the regular fertilizer. The tree should also be given thorough, shallow cultivation.

Trees in a frenched or dieback condition require a somewhat different method of treatment.

When the trees have made a good growth and are ready for pruning, the cuts should be made well back into the live wood and all cuts should be made close to the parent limb or trunk so as to leave no stubs. This can be done if the position of the cutting blade or saw is watched carefully. A good, rapid pruner will do this and in addition will, while finishing one cut, be studying where the next cut will be made.

Bordeaux-Oil.

If scab is to be controlled on grapefruit the pre-bloom spraying with bordeaux-oil should have been done some time ago. The after-bloom spraying for scab can often be timed so that it will come late in April and thus help a great deal in controlling melanose.

Where melanose control is the main end in view it should be done the latter part of April and surely finished by the tenth of May or even by the fifth of May in ordinary seasons. It is not a bad plan to leave the trunks and main branches unsprayed with the Bordeaux so as to leave a place for the beneficial fungii to live over. The follow up oil spray should be applied the last of June or the first of July. This follow up spray should be just as thorough and if possible even more thoroughly done than the Bordeaux-Oil so that all parts of the trees are covered.

Cultivation.

Bearing trees should receive shallow cultivation to save moisture. This may be continued up to the time the summer fertilizer is applied. Where non-cultivation is practiced this, of course, does not apply.

In young groves the tree rows should be cultivated regularly. If this was done all in one direction last year it would be a good plan to change and go across the grove this year so as to give a chance for the cover crop to grow where it was kept down last year.

INJURY TO ORCHARD TREES BY TERMITES OR "WHITE ANTS"

Continued from page 17

attack and injure fruit trees, namely subterranean species which attack the trees through the ground and wood-boring termites which infest the wood directly—usually at a scar or wound. These insects are rapidly becoming more and more important as pests of living trees and other growing plants.

Avoidance of recently cleared woodland in planting young orchard nursery stock, clean cultural or horticultural management and deep fall plowing will prevent much injury.

In the case of valuable trees which become infested, several insecticides can be successfully employed. Carbon disulphid as a gas or emulsion, calcium cyanide and paradicholorobenzene are recommended for trial, although entirely conclusive results as to their effectiveness have not yet been obtained.

3. In each gallon of the water used for diluting kerosene emulsion or miscible oil dissolve one ounce of sodium arsenate.

THE STORY OF AN INSECT PEST

Continued from page 22

Summary

To sum up the recommendations: we recommend that growers use, in so far as it is practical in their own particular locality the entomogenous fungi found useful in the control of the whiteflies and, of course, also use other entomogenous fungi found effective in the control of scale-insects, and possibly other insects. If, after the period of summer rains has passed, which, as previously stated, may be about the middle or end of September, the control of the whiteflies by means of fungi is not satisfactory, growers are urged to give a thorough spraying with a good oil spray as a final clean-up. It should be noted also that spraying early in fall rids the trees of the fall brood of whitefly larvae and some scale-insects, and especially in the case of the whiteflies leaves the trees comparatively free from infestation during five to six months, thus ridding the trees of the terrible drain of the whitefly larvae, a million of which, as has been computed from actual weighings made, are capable of extracting approximately 180 pounds of honeydew per year. This 180 pounds does not include the material which the trees have to furnish for the building of the bodies of the insects. If a most thorough spraying is made in fall we generally regard it as unnecessary to spray again in April or May, but, of course, if growers omit the fall spraying, it may be imperative that they should give the spraying in April or May, beginning ten days or two weeks after the spring brood of the adult whiteflies has nearly or wholly disappeared from the wing. These are our recommendations that have been found to work, and failures are generally due to poor spraying or to spraying too late, or to failure in diligently distributing the entomogenous fungi during the period of summer rains. Spray solutions are most effective against the young insects and destroy but few, if any, of the eggs, if the spraying is done too early, before most of the eggs have had time to hatch, or too late after the adults have begun to emerge and lay eggs. Finally, a program for the control of whiteflies, including scale-insects, that may work admirably in one locality may require an additional spraying in another locality, or vice versa.

I refer again to a "SPRAY SCHEDULE FOR CITRUS," which may be obtained by addressing the Cooperative Extension Division, Florida Experiment Station, Gainesville, and a copy of which should be in the possession of every citrus grower.

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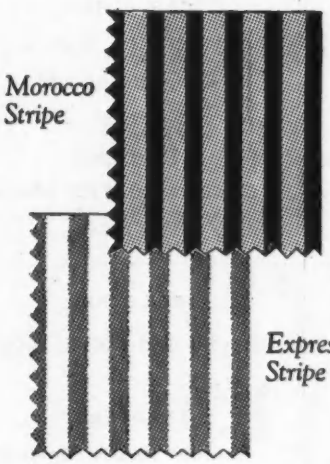

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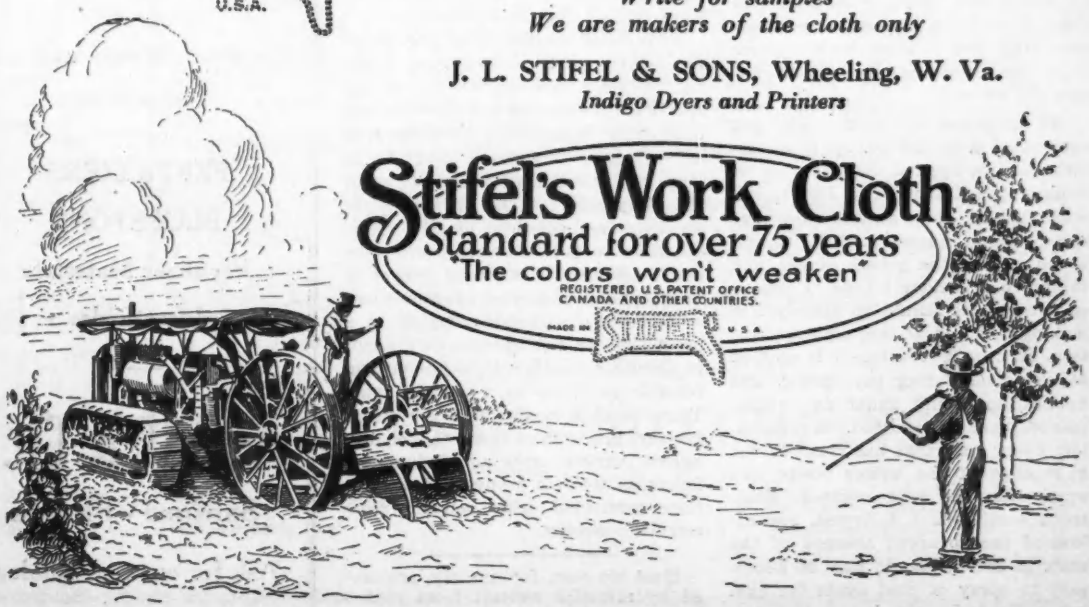
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SPRAYING AND DUSTING FOR THE CONTROL OF INSECTS AND MITES ON CITRUS.

Continued from page 8

ing or dusting with sulphur in most instances from about March 15th to April 15th and another application in June.

Control of Insects in Groves Where Fungicides Have Been Used.

If some fungicides could be obtained that would be potent enough to prevent such diseases as scab and melanose and at the same time have little or no effect upon the beneficial fungi, it would certainly be an ideal situation in so far as controling insects in Florida is concerned. At the present time this is impossible and, if the citrus grower expects to grow fine fruit, free from melanose and scab, it will be necessary for him to expect some disadvantages in the way of increased insect and rust mite infestation. This, however, is not so bad as certain examples might indicate.

Oranges—

Assuming that spraying for melanose with Bordeaux combined with 1 per cent oil as emulsion has been given sometime from April 15th to to May 15th, it would be necessary to spray again in May with plain oil emulsion, since the above combination kills white flies and scale insects. In addition to preventing melanose and killing insects it also prevents ammoniation to a remarkable degree.

Spraying or dusting the trees with sulphur about the last of May or first of June to prevent rust mite damage is very essential. As a general thing rust mites become very abundant from two to three weeks earlier following Bordeaux-oil than on unsprayed trees.

Oil emulsion containing 1½ per cent of oil in the diluted spray material should be applied the last week in June or the first week in July to kill scale insects. It is at this time that the maximum numbers of the second brood are in the young stages and therefore a greater killing is obtained. Great care should be exercised in making this a most thorough application. In case Bordeaux-oil is applied at any time during the spring, this application should under no circumstances ever be omitted. In practically every case that has come to the knowledge of the writer where this application has been omitted, disastrous results have followed, regardless of the apparent absence of the scale in the spring. It may be necessary to spray or dust again for rust mites. To decide this it is only necessary to examine the trees with a hand lens. It may also be necessary to spray the trees some time from October 1st to February 1st with an oil emulsion.

Grapefruit—

In case grapefruit are sprayed for scab using Bordeaux-oil, the usual winter spraying with plain oil emulsion may be omitted.

When the scab application is made in the late dormant period it will be necessary to dust with sulphur or spray with lime-sulphur solution in April providing an application of sulphur has not been already given during the spring. On the other hand, if spraying for scab is given after the petals have fallen the above sulphur application may not be necessary until May. If the scab treatment is followed by melanose spraying, this spraying with sulphur could be omitted, provided, of course, that the melanose spraying was done some time around the last of April or early May. The oil in the combination would be sufficient to hold the rust mites in check until the regular late May or early June spraying. It is important to make frequent observations to determine the extent of the infestation of rust mites and if they appear in sufficient numbers to cause blemishes, treatment should be given at once.

The application for scab reduces melanose to a considerable degree but not nearly so much as that applied during late April or the first few days of May. As in the case of oranges, if Bordeaux-oil has been applied to the trees in the spring, they should be most thoroughly sprayed the last week in June or the first week in July for scale insects.

It is fully realized that the question as to when to spray and when not to spray in order to obtain the maximum amount of benefit with the minumum expenditure of money is an extremely intricate one. It is largely a question of judgment as to the abundance of the various pests present and whether or not their continued presence would cause very much damage. If a citrus grower is in possession of a good hand lens and studies the question thoroughly, in a short time he can become very adept in deciding whether it is proper and feasible to spray at a certain time. There is also available to the citrus grower the advice from the county agents, various state and federal officials as well as recognized authorities connected with reliable commercial concerns.

Most old men, fortunately, are saved by merciful conceit from realizing how ugly they are.

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CONTROL CITRUS MELANOSE AND THEREBY PREVENT "AMMONIATION"

Continued from page 9

special measures should be taken to control the disease. In flatwoods and hammocks or other low damp locations, citrus melanose occurs in abundance and many of the older groves of Florida are set in such places. The disease has not been found to be severe on wild citrus growing in densely shaded hammocks where the citrus trees grow very slowly but have a healthy color of foliage. In many instances the disease is more pronounced in inland sections than close to the seashore.

Melanose has not yet become a chronically serious disease in the extreme southern citrus districts, although this disease caused an enormous damage in that general territory following the freeze of 1917. This is strong evidence that if conditions are favorable for outbreaks, citrus melanose should be expected to become a serious menace for a limited time at least in any fruit district in southern Florida. In the northernmost fruit districts of Florida, especially those that are occasionally damaged by freezes, citrus melanose becomes especially severe following cold winters.

In the ridge section of Central Florida melanose has not become especially abundant due, perhaps, to the relative dryness of the air in that section as well as to the fact that most of the plantings there are comparatively young, many of them being grapefruit, one of the most susceptible forms.

Citrus melanose occurs on a wide range of plants of the family to which citrus belongs and it seems that all commercial varieties of citrus grown under Florida conditions are attacked by the disease. Among the citrus varieties grown commercially the kumquats are perhaps the most susceptible—they are extremely so. Grapefruits rank second in susceptibility. The lemons, round oranges, sour oranges and the kid glove oranges, although distinctly less susceptible than the grapefruits, are attacked severely whenever conditions are especially favorable for infection. Observations over a period of nine years and inoculations made during six years fail to reveal any appreciable difference in the degree of susceptibility possessed by the commercial varieties within the same species. Susceptibility seems to be possessed in about the same degree by the fruit, leaves and twigs.

Control of Melanose.

Theoretically, melanose might be controled by the removal of sources of infection by pruning out all dead wood. Such a method should and doubtless would give excellent results if a perfect job of pruning were done and all dead wood removed as fast as it accumulates. To prune with the required degree of thoroughness would be an endless undertaking. Especially during the season of maximum melanose infections both young and mature fruits are falling continuously and their stems are dying back. All such parts as have died recently are excellent places for Phomopsis development.

Although cutting out the dead wood as a means of preventing melanose infections in the average bearing grove has been recommended for a number of years, it has not been found commercially practicable and has not been generally adopted.

A careful experimental test of the pruning method of preventing melanose infections was made by the writer in a mature orange grove in 1921, in 1922,, again in 1923. This grove was divided into several blocks, and one block was pruned each month, beginning in spring before infections had taken place and continuing until fall, well after infections had ceased. The trees were sufficiently large to carry an average of four to five boxes of fruit annually and required one to two hours each for a man to cut out the dead wood. The work was done as carefully and as rapidly as could be expected in commercial operations. It is obvious that pruning out all dead twigs and sprigs is a slow and extremely difficult operation and necessarily expensive.

Although some blocks were pruned just before fruit infections occurred, and some were repruned the second year, little or no control of melanose resulted. Therefore, it seems that pruning dead wood from normal mature trees is not likely to reduce melanose infections to such an extent that this method alone can be relied upon to afford commercial protection from this disease. The removal of such parts seems to promote vigorous growth.

It is good grove practice to prune out regularly the larger dead and dying limbs. After severe injury by storm or cold special pruning of the trees will be required.

Since the sticky Phomosis spores would have little, if any, chance of being carried from the ground to fruit on the trees, no special disposition of fallen fruits or prunings beyond ordinary good orchard practice seems to be required.

Even if thorough pruning, when employed once or twice a year, were an effective means of controlling melanose, it could not be generally used because of the excessive cost, the probability that the best results would be obtained from pruning just ahead of the melanose outbreaks—a time when many other operations demand

Continued on page 44

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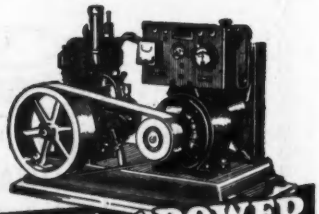

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W. W. THOMAS, Mgr.

In these days when the margin between production cost and returns for fruit is becoming more and more narrow, when a good crop of clean fruit is absolutely necessary if the grower is to realize a profit on his year's work, it is high time for growers to get right down to brass tacks in the matter of pest control.

It is no secret that prevailing methods of control are far from satisfactory. The kill is often poor because the grower is afraid of spray-burning if material of greater strength is used. And when sufficient strength is used to insure an effective kill the resulting damage is often serious, and sometimes disastrous.

There is a very narrow margin between the necessary strength to insure effective control of the pest and the point where injury begins. That margin of safety has been miscalculated by many a grower with serious results. Burned and pitted fruit has cut down his profits and in many cases the trees have been made less productive. There have been instances where the entire grove has been almost totally defoliated.

This danger has been eliminated, however, by VOLCK, a citrus spray which gives the most effective control of scale possible without injury of any kind to fruit or foliage. It is beyond doubt the greatest single achievement in the field of citrus culture in a decade.

Thousands of acres were sprayed with this material in California during the past two seasons and everywhere the results have been uniformly good. It has produced clean healthy groves and in no instance has caused injury,—no pitting, burning, or falling of leaves.

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ORTHO SPRAYS
HIGHEST AWARD PANAMA PACIFIC EXPOSITION 1915
CALIFORNIA SPRAY CHEMICAL CO.

A Monster Tangerine Grove

By Harold Lyman Wall

What is believed to be by far the largest individual tangerine grove in Florida has just been planted two miles south of Tavares by L. B. Saffer, of Tavares. The grove is a sixty acre affair, lying west of the Tavares-Clermont clay road, and is opposite the juncture of that highway and the Lake Jem road. In shape, it is almost square, although it has for a part of its north boundary Lake Idamere, one of the most beautiful of the smaller lakes in central Florida.

The desire of the planter, who has owned a large tract of Lake county land for ten years, has for some time been to have a grove planted exclusively to tangerines, but not until this year did he carry out his wishes in this respect. The tract is planted to Dancy variety trees, Mr. Saffer having budded the two year old trees on five year old sour orange stock. The whole grove is planted in 25 foot squares, so that there are approximately 4,200 tangerines, and with planting completed approximately four weeks ago, the shoots had already exhibited a surprising growth two weeks later.

The new grove is planted on high pine land for which Lake county is especially noted, and is in the immediate vicinity of some of the most highly productive citrus lands in the state. The tract itself has a gray sandy soil, with a yellow sand clay subsoil, which, according to the belief of Mr. Saffer, will be an excellent combination for tangerine production. Prior to planting, the growth on the tract was turkey oak, although there was almost a twenty-five percentage of scrub oak. The grove lies in the midst of a large group of the 1,400 lakes for which Lake county is known all over the world, and is approximately a mile and one half from Lakes Dora, Harris and Little Harris, lying nearly in the center of an imperfect triangle formed by these three larger bodies of water.

The sixty acre development lies on what is probably the highest land in the immediate neighborhood, and is ideally situated in every respect. Sourrounding it are approximately 4,000 acres of land owned by Mr. Saffer, which are known as the Tavadora Estates. Of this 4,000 acres, all of which is excellent citrus soil, 400 acres have been improved with grove plantings during the last few years. The groves owned by Mr. Saffer are scattered about the 4,000 acre development, and are all well located with reference to water and highways. Each of them may be included in a radius of three miles from Tavares, the Gem of the Lakes, and the capital of Lake county.

In the clearing of the land for the sixty acre planting of tangerines just completed, Mr. Saffer used for the first time in his development work a 10-20 International tractor for pulling trees. The tractor, he stated, did excellent work when used with a 70 foot cable, and would pull with but little difficulty trees from six to eight inches in diameter. The planter adopted this method of clearing after finding that the tractor would take out not only the trees but also all roots. This method is much more adaptable to quick, clean clearing work than is chopping down the trees and bushes and leaving many roots in the soil. Pine stumps are burned or blown out by dynamite.

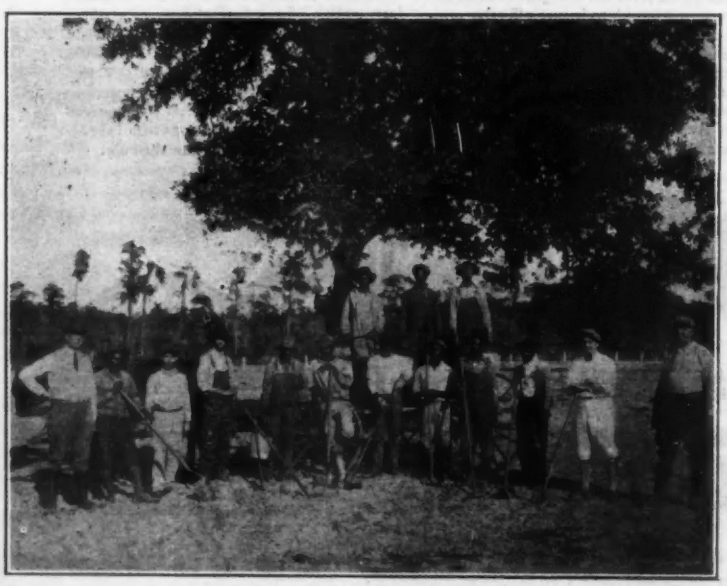
Because of the constant need of nursery stock in his development work, Mr. Saffer has set out his own nursery of approximately seven and one half acres between the rows of tangerine trees in the newly planted sixty acre grove.

The sixty acre piece lies approximately a mile form the center of Tavadora, a subdivision of 700 homesites which Mr. Saffer is developing this year. This subdivision, a tract of 300 acres, is laid out around an 18-hole golf course which is being built for the Tavadora Golf and Country Club, and is bounded on the west by the Tavares-Clermont road, to be asphalted in the near future, and on the east by Lake Dora. Mr. Saffer has given the land for the golf course to the members of the club, who are purchasers of homesites in the subdivision. In addition to this gift, he has guaranteed to construct the first nine holes of the golf course and to donate $50,000 toward the building of the course and the club house, which is to lie on an island in Lake Dora.

The owner and developer of the large tangerine grove and the other tracts of Tavadora Estates is an immigrated Floridian. He was until the time of his retirement an attorney of Urbana, Illinois, where he still maintains extensive agricultural and business interests. He moved with his family to Florida a year and a half ago, and lives in Orlando, although he spends the most of his time in and around Tavares.

"Lake county and Tavares, in my estimation, have in prospect a most substantial future," he stated a few days ago. "There is no doubt but that with the 1,400 lakes of the county and the wonderfully beautiful rolling land, it will come into its own as one of the most desirable locations for permanent or part time residence. While I am primarily interested in the agricultural possibilities of the

Continued on page 46



Workmen in Saffer Tangerine Grove

If You Were to Build a City What Kind Would It Be?

If you were given the power to make a city, just the kind of a city you'd like to live in, to work in, to spend the years when you must face the western slope, and leave to others what you have created, what kind of a city would that be?

You'd make it a place of beauty, with smiling skies of azure, above blue lakes that would forever be open spaces for the pleasure of the people; you'd have old oak trees, hung with silver gray moss, along well-paved streets, and you'd have flowers and shrubs and fragrance of jasmine and roses and orange blossoms.

You'd make sure that the water was pure and abundant for today's needs and tomorrow's anticipated requirements. You would have light and power for the comfort and the work of the people.

You would have the best of schools, teachers and buildings with Florida sunshine and health giving air a part of the planning.

You would have a fine public library, churches, music, outdoor recreations, theatres, country clubs, civic organizations, women's clubs, baseball.

You would build handsome homes and have them owned by those who lived in them.

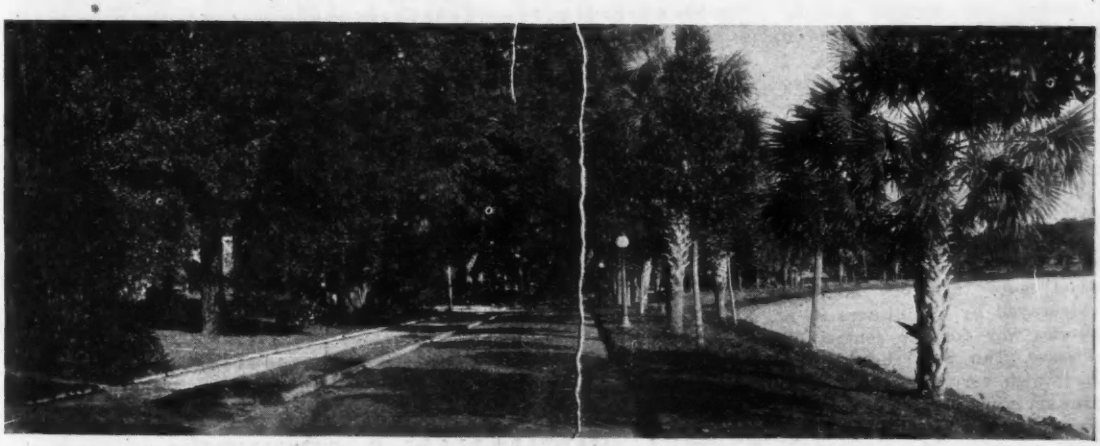
You'd have luxurious hotels and apartment houses, and you'd have hotels for visitors who wished to spend a week or a season with you at reasonable rates.

You would have excellent stores carrying high class marchandise and selling it at fair prices.

You would have good roads extending in every direction from your city and adding to your purchasing public the thousands of good neighbors who would thus be yours.

You would ask wholesalers to make your city their headquarters, because of the central location you would choose, and you would have thriving industries with contented workers.

In fact you'd have ORLANDO.



ORLANDO CHAMBER OF COMMERCE

ORLANDO, FLORIDA

"The City Beautiful"

Write the Orlando Chamber of Commerce for information, and for the Orlando Magazine, which carries new pictures of this city of twenty-two thousand, and tells the story of its marvelous progress.

CONTROL CITRUS MELANOSE AND THEREBY PREVENT "AMMONIATION"

Continued from page 40

attention, such as shipping late fruit and spraying, fertilizing, and cultivating the groves.

Experimental tests with fungicides applied as dusts have not given a satisfactory control of melanose.

Since the season for spray applications for the citrus white fly in May coincides rather closely with the usual season of severe melanose outbreaks, it seemed to the writer that 3-3-50 Bordeaux mixture plus 1 per cent oil in the form of emulsion applied at that time would act on the white fly and at the same time reduce melanose infection.

Results of Spraying Experiments and Commercial Tests

In 1920 a series of spraying experiments for melanose control was made with Bordeaux-oil emulsion. This, so far as we know, was the first effort to control melanose by spraying since Swingle and Webber's experiments 1896 at Citra, Florida. Good commercial control followed single applications early in May before much infection had taken place. Almost perfect results were obtained on plats sprayed twice or oftener. As a result of these and subsequent experiments, commercial spraying for melanose control has been in general practice in a number of sections of Florida since 1921.

Investigations conducted during the last five years by the U. S. Bureau of Plant Industry have shown conclusively that the melanose disease of oranges and grapefruit can be satisfactorily controlled by a single properly-timed application of Bordeaux-oil emulsion. During the same period careful records have been made on more than one hundred groves sprayed by the owners in a commercial way for the control of this disease. The best control was obtained, with very few exceptions, when the spraying was completed just in advance of the onset of the May rains. This treatment also checked the development of fruit "ammoniation" and other forms of dieback, and in addition, fruit so sprayed did not decay after picking as rapidly as unsprayed fruit. It was necessary, as a rule, to make an application of an oil-emulsion in late June for scale insect control.

Spray Recommendations

Bordeaux-oil emulsion is the most effective material to use. 3-3-50 Bordeaux plus 1 per cent oil as emulsion seems to be about the right strength; weaker Bordeaux preparations are much less effective and stronger preparations are unnecessary. This spraying is almost certain to prevent the fruit from becoming "ammoniated."

Insecticide applications must follow the use of Bordeaux-oil emulsion to prevent serious scale injury. One application of 1½ oil as emulsion should be made the latter part of June and another in the fall, if necessary. Do not fail to spray or dust for rust mite control, otherwise the prevention of melanose is of little value because of the later russet injury.

ARTS AND ARTERIES

She had a vast amount of money, but it had come to her quite recently. One day an acquaintance asked her if she was fond of art.

"Fond of art!" she exclaimed. "Well, I should say I was! If I am ever in a city where there's an artery, I never fail to visit it."

A Law Abiding Outlaw—That's his name—OUTLAW. And he isn't an outlaw at all. His name is Grover Cleveland Outlaw and he is a fine citizen. He is the new mayor-commissioner of St. Cloud down in Osceola county. He believes in law enforcement and is a great booster for Florida.—Gainesville Sun.

DIAGNOSIS

Doctor—You seem to be all run down, Mrs. Peck. Let's see your tongue.

Henry Peck—That's right, doctor, you guessed it right off!

ORGANIZE A BAND
in your town

OUR SPECIALISTS WILL ASSIST IN ORGANIZING AND EQUIPPING A BAND OR ORCHESTRA FOR YOU.

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WORLD'S LARGEST MANUFACTURERS OF HIGH GRADE BAND AND ORCHESTRA INSTRUMENTS

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Personal Attention to all Details.
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HORTICULTURISTS GATHER IN LAKE COUNTY

Continued from page 5

steady growth, and offers splendid opportunities for profitable investments in real estate and business enterprises. Active churches, secret societies, clubs, efficient schools, library, public utilities, chamber commerce, make Eustis a modern city in every essential respect. For the retired business man and his family, the wearied worker, sportsmen, those desiring a change to a mild all-year climate, Eustis is a haven of contentment and happiness in the heart of the lake region and pine-clad hills of Lake county, where orange and grapefruit groves abound, where perpetual sunshine, health-giving breezes, prolific nature, abundant fish and game, golf, tennis, roque, croquet, quoits, swimming, boating, trap-shooting, children's playgrounds, and celebrated hotels, conjoin to make Eustis a most desirable place to spend your vacation, or to buy or build a permanent residence. The influx of many new families; the numerous sales of farms and other properties adjacent to this city gives reason for belief that Eustis will shortly become a city of much larger proportions.

Golf Links—Hole No. 4

Growing oranges, grapefruit, melons, grapes, etc., is both a pleasure and a profitable business here. During last season, 437,716 boxes of citrus fruit were shipped from Eustis, netting a handsome profit for the growers. The Eustis Chamber of Commerce will gladly furnish further data on this subject.

Eustis has fared well during the past four years in increased population. Many new families have located here since the last census, and it is safe to estimate our population at 2,300 during the summer. While this figure seems low, yet the city, with its many activities, takes on the atmosphere of a city of 5,000 or more. Our winter population runs in the neighborhood of 4,800.

The officers of The Florida State Horticultural Society have left nothing undone to make this year's meeting of the Society the equal of any which has been held in the past, and the citizens of Eustis are exerting every effort to properly entertain and care for the noted men and women who will be guests of the city during the progress of the meeting.

DUSTING SULPHUR

FOR CONTROL OF

Rust Mite, Red Spider, Powdery Mildew, Cotton Flea and Other Pests

"ANCHOR" BRAND SUBLIMED VELVET FLOWERS OF SULPHUR

SUPERIOR QUALITY EFFICIENT AND ECONOMICAL

1. 100 Per Cent Pure.
2. Light and Fluffy.
3. Extreme Fineness; Greater Covering and Spreading Properties.
4. Strongest and Most Lasting Fuming Qualities.
5. Remains Longest on the Trees and Plants.
6. Does not Contain Adulterants such as Lime and Kaolin.

Send for Booklets "The Manufacture and Relative Values of Dusting Sulphurs", "The Truth about Sublimed Sulphur"; also U. S. Gov't Bulletins "Dusting to Control Rust Mite", Dusting and Spraying Charts, and "Control of Cotton Flea".

STAUFFER CHEMICAL COMPANY OF TEXAS

Houston, Texas

Manufacturers and Refiners of All Grades of Dusting, Spraying and Agricultural Sulphurs

Distributors for Florida

Chase & Co., Sanford
Hector Supply Co., Miami
Florida Insecticide Co., Apopka
E. O. Painter Fertilizer Co., Jacksonville

STAUFFER QUALITY CHEMICALS

"ANCHOR TO STAUFFER"

CITRUS MELANOSE —ITS CONTROL

Investigations conducted in Florida during the last four years by the Bureau of Plant Industry, United States Department of Agriculture, have shown conclusively that the melanose disease of oranges and grapefruit can be satisfactorily controlled by a single properly-timed application of Bordeaux-oil emulsion. During the same period careful records were kept on more than 100 groves sprayed by the owners in a commercial way for the control of this disease. The best control was obtained, with very few exceptions where the spraying was completed just in advance of the onset of the May rains. This treatment also checked the development of fruit "ammoniation" and other forms of dieback, and in addition, fruit so sprayed did not decay after picking as rapidly as unsprayed fruit. It was necessary, as a rule, to make an application of oil-emulsion in late June for scale insect control.

For the guidance of fruit growers, the United States Department of Agriculture has issued Department Circular 259, Commercial Control of Citrus Melanose.

Melanose is a fungus disease. The spray to be used is the standard 3-3-50 Bordeaux mixture plus 1 per cent oil in the form of oil emulsion. In the average season the application should be made before May 5. Weak Bordeaux mixture and other weak copper sprays are not as effective as the one recommended, says the circular. And sulphur sprays as a class have little or no effect at all. Copper or sulphur dust applications have not thus far proved satisfactory. Thorough pruning of the dead wood as a sole means of controlling melanose in a normal mature grove is not likely to give paying results.

The circular warns that unless rust mites and scale insects are controlled later, time and money invested in melanose control are largely lost because of the development of other injury.

Copies of the circular may be had free by writing to the United States Department of Agriculture, Washington, D. C.

Where there are many thrips in the bloom, one can substitute for this spray the regular thrips spray which consists of a half pint of nicotine sulphate in the lime-sulphur spray solution commonly used for rust mite and red spiders, namely, 3 quarts of lime-sulphur to 50 gallons of spray.

A MONSTER TANGERINE GROVE

Continued from page 42

county, I am nevertheless thoroughly sold on the inland waterways which abound in this section of the state. With the combination of the two large attractions, I see no reason why there should not be a most remarkable growth in this section of the county very shortly".

Mr. Saffer is planning other developments, he announced recently, which will rival in proportion the sixty acre tangerine grove and the other developments on Tavadora Estates.

CLASSIFIED ADVERTISEMENTS

The rate for advertisements of this nature is only five cents per word for each insertion. You may count the number of words you have, multiply it by five, and you will have the cost of the advertisement for one insertion. Multiply this by the total number of insertions desired and you will have the total cost. This rate is so low that we cannot charge classified accounts, and would, therefore, appreciate a remittance with order. No advertisement accepted for less than 50 cents.

REAL ESTATE

For Sale—Pineapple land in winterless Florida. $15 an acre. Almont Ake, Venus Fla:

WANTED—To hear from owner of farm for sale, for fall delivery. O. K. Hawley, Baldwin, Wis.

FOR SALE CHEAP—Eleven acres high, rooly citrus land; 4 acres cleared with small house, and large nice bearing orange trees full of fruit. Nicely located near Altamonte Springs, Fla. For particulars write H. A. Lunquire, 41 N. W. 29th St., Miami, Fla.

WILL EXCHANGE West Texas cattle ranch for unimproved or improved land in Florida. What have you? Give price and full particulars. T. E. Bartlett, 3410 McKinley Ave., ElPaso, Texas.

EARLY BEARING Papershell Pecan trees, budded or grafted and guaranteed. Great shortage this year. Write for catalog today. Bass Pecan Company, Lumberton, Miss.

Want to hear from owner having farm for sale; give particulars and lowest price. John J. Black Chippewa Falls.

NURSERY STOCK

FOR SALE—Cleopatra Mandarine seedlings. September delivery, enter order now. Cavendish banana plants and avocado trees. Write for price list. R. E. Skinner, Hillsboro Hotel, Tampa, Florida. May-4t.

BANANA PLANTS for sale. Improved Cavendish, Hart, Orinoco, Ladyfinger. Information free. W. E. Bolles, Oldsmar, Fla. tf

"BOOK OF TRUTH"
For planters of new groves
Is yours for the asking,
Write Today.
OCKLAWAHA NURSERIES INC.
"Pedigreed Citrus Trees"
Lake Jem, Florida

POLK LAKE NURSERIES

Offer to the grower young trees of standard variety, backed by 30 years of nursery experience and a guarantee which only honest dealing can justify. For full information address A. H. Sloan, Box 413, Bartow, Fla.

AGENTS WANTED—We want good, reliable parties to act as our agents in their local communities, selling our citrus trees on a liberal commission. A good opening for the person who will devote all or a part of their time working among their neighbors. Lake

MISCELLANEOUS

LAND INSPECTION Soil Surveys—Consultations. Advisory services. Appraisals. All agricultural branches. Specialities: Town planning, Landscaping, Citriculture, Tropical fruits, Viticulture, Trucking, Livestock. Lindley Heimburger, B. S. Agri., M. S. Agricultural Engineer, Chemist, Box 226, Tampa.

FOR SALE—Dairy and stable manure, car lots. Link & Bagley, Box 464, Tampa, Florida. 6t

WHITE WYANDOTT Cockrels, regal strain—the best in the country, direct from Martin pens. Utility and show birds $5.00 each; also eggs for hatching $5.00 per 15. W. A. King, Gen. Del., St. Petersburg, Florida.

SOUTHDOWN SHEEP, White Rocks, Toulouse Geese, Guineas, Angora and Milk Goats, Circular free. Woodburn, Clifton, Va.

AGENTS—Quality Shoes, quick sellers. Big commissions, immediate returns! Repeat orders. Experience unnecessary. Write full particulars. Tanners Shoe, 2011 C St. Boston.

FOR SALE

Remington Portable Typewriter with standard keyboard. Has all advantages of larger machine. Ideal for farm and home use. $60. cash or sold on easy terms. Remington Typewriter Co., 103 Parker St., Tampa Florida.

CONDENSED DATA—on Tung Oil Industry has been compiled by B. F. Williamson and E. L. Lord. By application to B. F. Williamson, Gainesville, Florida, this booklet will be sent Nursery Co., Leesburg, Fla.

FARM—GROVE—HOME

22 acres large bearing grove; modern two-story, 8 room house, completely furnished on third largest lake in state in thriving town; good roads, church, school; complete line farm implements and tools. P. F. Cloonan, Yalaha, Lake County, Florida.

GROVE HEATERS—Several hundred oil grove heaters at less than one-third original cost and practically new, only used once. Heaters, drums and oil all in good condition. Apply to Lewis E. Klatte, The Gem Nurseries, Lake Jem Florida.

POSITION WANTED—Competent citrus grove superintendent wants supervision of groves where quality fruit is essential aim. 12 years technical and practical experience. Care Citrus Industry.

HIGH BLOOD PRESSURE easily, inexpensively overcome, without drugs. Send address. Dr. J. B. Stokes, Mohawk, Florida.

CONTINENTAL VITALITY CHICKS now hatching. Eleven tested varieties to select from. Your copy of our circular giving full particulars is waiting. May we send it? Address, 332, The Continental Hatchery of Valdosta, Ga.

YOU FLORIDA LAND POOR REAL ESTATE OWNERS—Trade your Florida land for a time tried and road tested car. From Ford to Lincoln; Oldsmobile to Cadillac; Cleveland to Chandler, or Essex, Hudson; Buick or Dodge; all makes of cars. Open or closed cars. Title of land must be acceptable to such legal authorities as Gibbons and Gibbons of Tampa. Lands must have good location, almost any soil, series and type, if other conditions are fulfilled and checked by soil expert such as Lindley Heimburger, Tampa, said to be the leading authority in Florida. P. O. Box H-226, Tampa